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Foundry Weeks

It is common knowledge within the ironfounding section of the industry that the Government, through the Ministry of Supply and the Ministry of Labour, intend in the near future to launch a campaign for increasing the recruitment of labour for foundries. Whilst the plans are still somewhat nebulous, it is probable that a number of agencies will operate simultaneously. Thus it is thought that there will be a countrywide display of posters at the labour exchanges, and in other strategic positions. This effort will be supported no doubt by a trailer film, lasting about a minute, to be shown in all cinemas throughout the country to follow the usual news reel. Probably there will be an appropriate talk on the wireless, if a suitable broadcaster can be found, and, maybe, displayed advertisements in the Press.

This would ensure a very comprehensive and, no doubt, useful recruiting campaign, and it will receive a maximum amount of support from us. To achieve real success, however, it requires not merely the support of the organisations within the industry—both employers and trade unions—but of every foundry throughout the land. Whilst no doubt the Government have in mind as a major result, an improvement in the supply of builders' castings, if the campaign is well conducted it will also help all types of foundries, as it is reasonably certain that the man-in-the-street will fail to differentiate between one branch and another. It would, we believe, be helpful if as many foundries as possible would organise through their local associations, district " Foundry Weeks," by opening their shops for inspections, and supplement this by a small local exhibition. This may sound a little extravagant but it has been done in America, where they even resorted to brass bands and loud speakers.

Until we have seen the type of propaganda to be made, we obviously cannot judge as to whether an appeal will be made to youth or to the adult section of the population. After due consideration, we think that the most profitable field for recruitment is the returning ex-Serviceman, as he is more of a free agent, but at the same time is still in the formative age. For those of school-leaving age, there is parental influence and sometimes prejudice, whilst a major factor is the worry of a broken apprenticeship through compulsory military service, or at the best, its deferment until later.

The industry must not be too critical of the Government's effort as they are tackling a particularly difficult subject. It is so very perplexing to find and portray within the limits at their disposal a true yet interesting cross-section of so complex an industry. The range between a sash weight and an automobile cylinder block, or a malleable boot protector casting and a 100-ton ingot mould, is so wide that one wonders where to begin. Naturally everybody will not be satisfied. That is why we suggest the organisation by the large centres of " Foundry Weeks."

DANGERS OF PROPHECY

Mr. O. Rendell, in his presidential address to the Manchester Association of Engineers, recalled that in 1879 a member, Mr. Bailey, had stated that " Mr. Edison should cease to be so foolish as to imagine that a house could be lighted by a red-hot wire." In 1869 the members were of opinion that " the velocipede, the forerunner of the bicycle, could only remain a toy."

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NOTES FROM THE BRANCHES

NEWCASTLE-UPON-TYNE.—The branch held their first meeting of the new session on October 12, in the Neville Hall, Newcastle-upon-Tyne. In his presidential address, MR. G. ELSTON congratulated members on the large attendance, and commented on the inactivity of the branch due to the war; he also expressed his satisfaction at the increased activity now apparent. He then urged members to exercise individual criticism of a constructive nature either in open meeting or with personal members of the branch council, emphasising that the members of that council were the elective choice of the members; non-attendance at meetings was a futile exhibition of criticism. Commenting on the importance of the Institute of British Foundrymen in British industry, he pointed out that it was a powerful body recognised nationally and internationally, its guidance and advice being frequently sought during the war by various Government departments. For the benefit of new as well as old members, Mr. Elston proceeded to give particulars of the scope of the organisation, pointing out the constitution of the General Council and its functions.

He paid tribute to the foundries and managements in assisting them in carrying out investigations and experiments. Continuing, he described the activities and aims of the various sub-committees, and the progress they had made. Progress in the general interests of the Institute had been helped by donations and bequests of more wealthy members or friends, and, amongst these, he cited the John Gardom Fund and the F. J. Cook Award for those who made the best suggestions to improve amenities in foundries—a matter of great importance to all engaged in the industry.

At this juncture, by the courtesy of Hadfields, Limited, a sound film was shown entitled, "The Production of High Grade Steel." Mr. Elston, on behalf of the branch, thanked the firm for their kindness. He concluded by announcing that lectures and two works' visits were included in their winter programme; also that there would be a Paper competition on February 8 open to associates and students in which he urged younger members to take part.

SIR JOHN CASS TECHNICAL INSTITUTE

The Department of Metallurgy at the Sir John Cass Technical Institute, Jewry Street, Aldgate, London, E.C.3, has organised a special course of 12 lectures to be held on Thursdays at 6.30 p.m., commencing October 31. Amongst the lecturers are Mr. Stanley Robson, Dr. C. H. Desch, Prof. G. I. Finch, Dr. B. Chalmers, Dr. W. D. Jones, Major P. L. Teed, Prof. C. W. Dannatt, Mr. A. J. Murphy, Dr. R. J. Sarjant, Mr. H. J. Hodsman, Dr. J. H. Chesters, and Dr. H. J. T. Ellingham. The fee for the course is £1, and application for enrolment should, if possible, be made to the principal prior to the opening date of the course.

THE WARRENPOINT SHIPYARD COMPANY, LIMITED, has closed its works at Warrenpoint.

BRITISH STEEL FOUNDERS' ASSOCIATION

At the conclusion of the convention, held in Sheffield recently, Mr. Charles Gill, chairman of the British Steel Founders' Association, commented as follows:—

It is not unusual for success to be claimed for such events, but this, the first technical convention to be held by the British Steel Founders' Association, has been a success in every sense of the word, without qualification. The attendance and the liveliness of the discussions indicate that the steel casting industry is by no means prepared to rest on the laurels it earned during the war years, and that it has every intention of being in the vanguard of engineering development in the years to come.

MR. CHARLES S. GILL.

The work of our technologists and metallurgists will be actively directed to greatly expanding the range of purpose for which steel and steel alloy castings will be available, and we shall welcome the opportunity of co-operating with all engineers who are engaged on development work.

ITALIAN FOUNDRY LABOUR

A procedure of application by employers who require Italian labour, is outlined in the monthly Bulletin of the Council of Ironfoundry Associations. There are three main points. First, there must be no objection to the employment of Italians by existing personnel. Secondly, it is necessary for employers to have an already unfulfilled demand for British workers on the labour exchange. The last point concerns the question of accommodation. Anything that could be done to assist billeting among present workers would facilitate arrangements for the allocation of the Italian workers.

Meanwhile, on inquiry, the Ministry of Labour refer to the situation as being "very much in the air at present."

THE SIGNIFICANCE OF VARIATIONS IN THE TENSILE PROPERTIES IN CAST BRONZES

By W. T. PELL-WALPOLE, B.Sc., Ph.D., A.I.M.*

The mechanical properties of cast bronzes vary between wide limits according to the type and extent of porosity present and the amount and mode of distribution of the compound phases. These features are determined by the melting and casting conditions employed in their manufacture, but may be modified by subsequent heat-treatment. In these materials high strength is accompanied by relatively high extension and *vice versa*. Thus, a typical industrial test-bar of chill cast 2B8 bronze (10 per cent. tin; 0.7 per cent. phosphorus) has a tensile strength of 17 to 19 tons per sq. in. with 3 to 6 per cent. extension. By special control of melting and casting technique, to eliminate gas and shrinkage porosity, this material may be improved to give 25 to 28 tons per sq. in. U.T.S., with 15 to 20 per cent. elongation. Similarly, a porous sand-cast test-bar of 88/10/2 gunmetal might give only 10 to 12 tons per sq. in. with 4 to 8 per cent. elongation, while a sound sand-cast bar of identical size and composition might give 20 to 22 tons per sq. in. with 30 to 40 per cent. elongation. This manner of variation of U.T.S. with elongation is the reverse of that normally encountered in metals and alloys whose properties can be varied by different treatments, *e.g.*, if the strength of a metal or alloy is increased by thermal or mechanical treatment then elongation is generally reduced at the same time, and *vice versa*.

In the course of an extensive series of researches on the effects of melting and casting conditions on the properties of bronzes and gunmetals, carried out by the Author in collaboration with the Tin Research Institute, sufficient data have been collected to permit a quantitative study of the relations between tensile strength and elongation, and the significance of the wide variations in values which may occur in these materials.

Variations in Properties of 2B8 Bearing Bronze

Values of tensile strength and of elongation for a series of 1-in. dia. chill-cast sticks of 2B8 bronze (10 per cent. Sn; 0.7 per cent. P.) are plotted in Fig. 1. These ingots had widely varying degrees of porosity, hence the wide range of strength and elongation values. The points form a broad band of curved form, and when the medium values of U.T.S. for each 2 per cent. range of extension are plotted (Fig. 2, curve A) a smooth curve is obtained. This curve, showing the average relationship between U.T.S. and elongation for this series of ingots, has the form of a normal load/strain curve for plastic deformation, and for comparison an experimentally-determined load/extension curve for a sound test-bar of the same composition and cast in the same mould is shown in curve B, Fig. 2.

*Gibbins Research Fellow, Birmingham University.

The close agreement between the form and actual position of the composite U.T.S./elongation curve 2A and the actual load/elongation curve 2B, indicates that the average values of tensile strength and the corresponding elongation figures used in constructing curve 2A

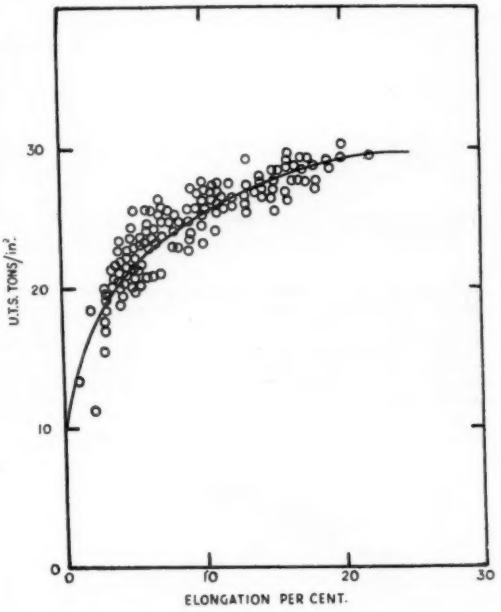


FIG. 1.—VARIATION OF TENSILE STRENGTH WITH ELONGATION IN 1-IN. DIA. INGOTS 2B8 BRONZE (10.0 PER CENT. SN; 0.7 PER CENT. P).

lie in a common curve representing the normal load/strain relationship for this material in tension. The origin of the curve represents an approximate yield point, and the slope is an approximate measure of the work-hardening capacity of the material. The extent by which the breaking stress for a given specimen exceeds the yield point depends on the extent to which that particular specimen can be deformed prior to failure. The greater the deformation (*i.e.*, the extension).

Mechanical Properties of Bronzes

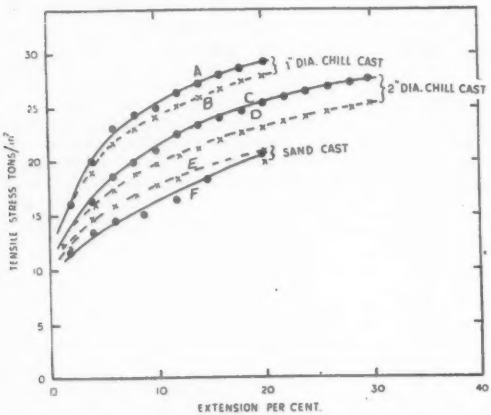


FIG. 2.—STRESS/EXTENSION CURVES FOR CAST 2B8 BRONZE (10 PER CENT. SN; 0.7 PER CENT. P).

the greater is the degree of work-hardening and the higher the ultimate stress. Thus, the wide variations in the values of U.T.S. recorded in Fig. 1 are due primarily to the corresponding variations in the extension (deformability) of the specimens. This, in turn, is controlled chiefly by the type and extent of porosity present in the various specimens tested.

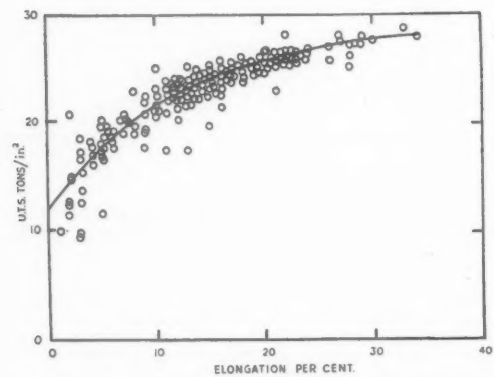


FIG. 3.—VARIATION OF TENSILE STRENGTH WITH ELONGATION FOR 2-IN. DIA. CHILL-CAST INGOTS OF 2B8 BRONZE (10 PER CENT. SN; 0.7 PER CENT. P).

A similar series of results of tensile tests on a large batch of test-bars from 2-in. dia. chill-cast sticks of the same composition are plotted in Fig. 3, and the curve for average U.T.S./extension in curve C, Fig. 2. An experimentally determined load/strain curve on a specimen from a sound 2-in. billet is shown in curve D, Fig. 2. The agreement between the composite U.T.S./elongation curve and the load/strain curve is again very close, but the curves have a lower origin and are less steep than the corresponding curves for the 1-in. specimens, *i.e.*, the 2-in. dia. billets have a lower yield point and lower work-hardening capacity than the 1-in. dia. billets. There were no essential differences in the types or range of porosity present in the two series of ingots, but the differences in their deformation characteristics may be attributed to structural differences in the two series. The larger ingots (2-in. dia.) cool more slowly

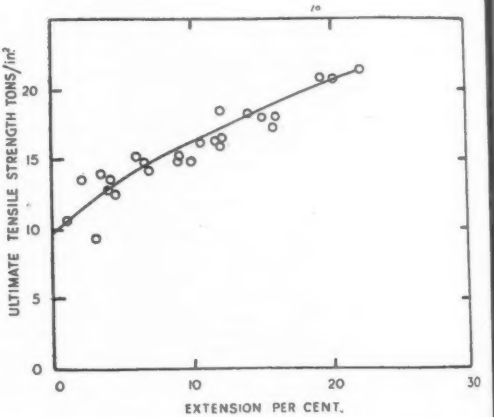


FIG. 4.—VARIATION OF TENSILE STRENGTH WITH ELONGATION IN SAND-CAST 2B8 BRONZE (10 PER CENT. SN; 0.7 PER CENT. P).

than the 1-in. ingots, hence they contain less of the brittle ($\alpha + \delta$) constituent; this constituent is also coarser in character and tends to occur in isolated pools rather than as intercrystalline envelopes. (Compare Figs. 13 and 14.) As would be expected this decreased amount and more isolated distribution of the brittle constituent renders the 2-in. dia. bars more readily deformable, *i.e.*, plastic deformation commences at a lower stress and a greater degree of deformation (extension) can occur before fracture.

This effect of structural distribution on the deformation characteristics probably accounts in part for the scatter of the observed points about the mean U.T.S./elongation curves in Figs. 1 and 3. Some of the ingots tested in each size, were prepared with widely differing

temperatures and rates of pouring. Such variations in casting conditions cause appreciable variation in the structural condition (as well as in the soundness) of the respective ingots. Thus the mean curves 2B and 2D represent the deformation characteristics for the average structural condition found in chill-cast ingots of these sizes respectively. Variation from the average structure may give a result which lies either above the curve, *i.e.*, indicating the presence of more ($\alpha + \delta$) than the average, or below the curve, indicating less ($\alpha + \delta$ than the average. A further feature which may contribute to the scatter of the points in Figs. 1 and 3, but which has not been studied in detail, is the variations in grain size which are produced by variations in casting conditions.

Results for a small batch of sand-cast 2B8 test-bars, poured over a range of temperatures and having varying degrees of porosity are plotted in Fig. 4. An

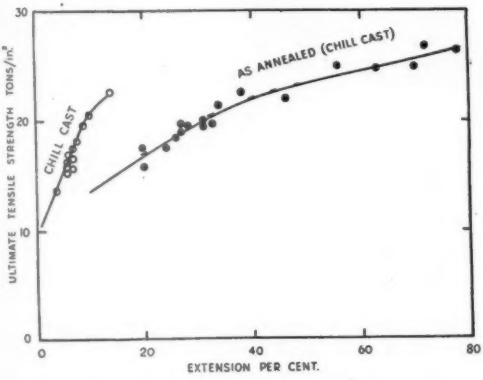


FIG. 5.—VARIATIONS OF TENSILE STRENGTH WITH ELONGATION IN CHILL-CAST AND IN CHILL-CAST ANNEALED 1-IN. DIA. TEST-BARS OF 88/10/2 GUNMETAL.

experimentally determined load/strain curve for a typical sound test-bar is given in curve F, Fig. 2. There is again close agreement between the composite mean U.T.S./elongation curve and the actual load/strain curves, but both curves have a lower origin and a less steep curvature than those of the chill-cast test-bars. These features are in agreement with the explanation advanced above of the relation between structure and deformation characteristics, for the slowly-cooled sand-cast bars contain much less of the brittle δ-phase (Fig. 15) than even the 2-in. dia. chill-cast bars.

Considering the results for the three types of test-bar together, it may be concluded that the tensile strength of cast 2B8 bronze depends on the extent to which the bar can be deformed before fracture (determined pri-

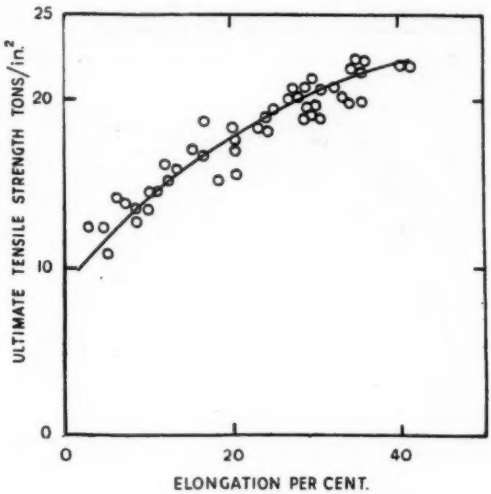


FIG. 6.—VARIATIONS OF TENSILE STRENGTH WITH ELONGATION FOR SAND-CAST 88/10/2 GUNMETAL.

marily by the soundness of the bar) and on the structural condition which controls the form of the stress/strain curve.

Admiralty Gunmetal (88/10/2)

The results of tensile tests on batches of 88/10/2 gunmetal in the chill-cast and chill-cast annealed conditions are shown in Fig. 5, and for sand-cast test-bars, in Fig. 6. Curves for mean U.T.S./elongation, are shown

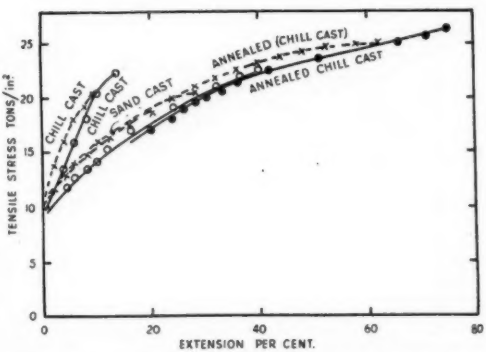


FIG. 7.—STRESS/EXTENSION CURVES FOR 88/10/2 GUNMETAL.

Mechanical Properties of Bronzes

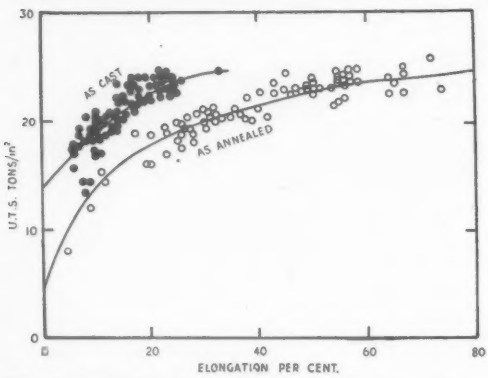


FIG. 8.—VARIATIONS OF U.T.S. WITH ELONGATION FOR CHILL-CAST 1-IN. DIA. INGOTS OF TIN BRONZE (9 PER CENT. Sn; 0.1 PER CENT. P).

as continuous lines, and experimentally determined load/strain curves for sound specimens from each batch are shown in Fig. 7. There is again very close agreement between each composite U.T.S./elongation curve and the corresponding load/strain curve, indicating that the explanation advanced above for the variations in U.T.S. and elongation for 2B8 bronze applies equally well to the gunmetal. The curve for chill-cast specimens has a higher origin and steeper slope than those for the sand-cast and annealed materials respectively, in agreement with the amounts of the brittle ($\alpha + \delta$) constituent present in the respective microstructures. (Fig. 16 and 17.) The annealed material which is not illustrated consists entirely of homogeneous α. Comparison of the curves for gunmetal with those of zinc-free bronzes containing an equivalent amount of compound shows that the zinc content causes a reduction of the stress required to produce plastic deformation, and a steeper slope to he curves, *i.e.*, a higher rate of work-hardening.

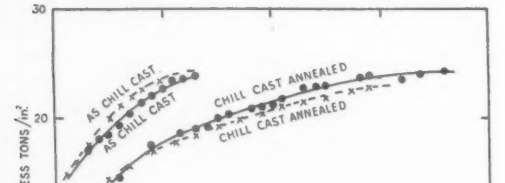


FIG. 9.—TENSILE STRESS/EXTENSION CURVES FOR CHILL-CAST, AND FOR CHILL-CAST ANNEALED FOR PHOSPHORUS BRONZE (9 PER CENT. Sn; 0.1 PER CENT. P)

Chill-cast and Annealed Low-phosphorus Bronzes

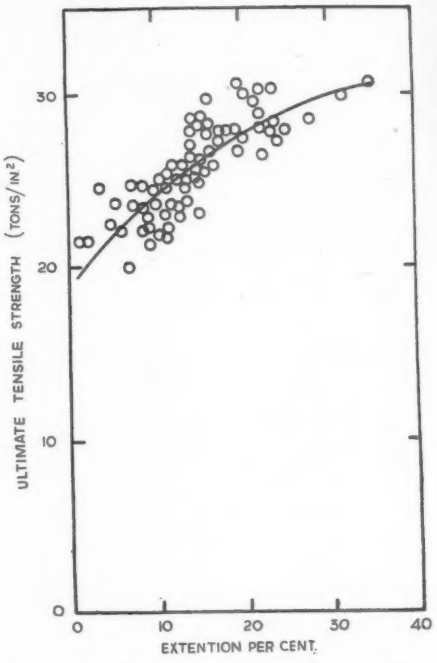


FIG. 11.—THE VARIATION OF TENSILE STRENGTH WITH ELONGATION FOR 5-IN. BILLETS OF HIGH PHOSPHORUS-BRONZE (9 PER CENT. Sn; 1.5 PER CENT. P).

Similar results of tensile tests on chill-cast and chill-cast annealed bars of low-phosphorus bronze (9 per cent. of Sn; 0.1 per cent. P) are shown in Fig. 8. The lower curve for annealed specimens shows clearly the higher extension for a given value of tensile strength, produced by the homogeneous α solution, as compared with corresponding values for as-cast samples which contain an appreciable quantity of ($\alpha + \delta$) eutectoid. (Fig. 18.) Similarly, the curve for mean U.T.S./elongation for the annealed samples has a lower origin and lower work-hardening capacity (slope) (continuous

curves, Fig. 9). Experimentally determined load/strain curves, for sound chill-cast and chill-cast annealed specimens, respectively (broken lines, Fig. 9) are in close agreement with the mean U.T.S./elongated curves, so that the relationship between these properties is the same as that deduced for 2B8 bronze and 88/10/2 gunmetal.

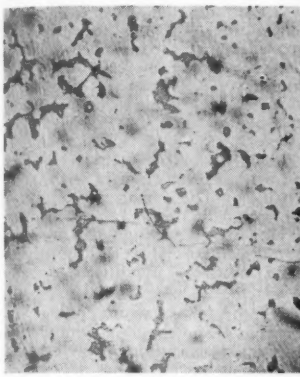


FIG. 13.—CAST IN 1-IN. DIA. CHILL MOULD.

FIG. 14.—CAST IN 2-IN. DIA. CHILL MOULD.

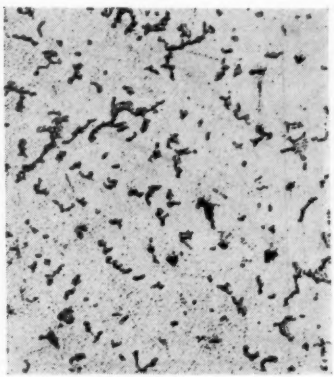


FIG. 15.—2B8 BRONZE (10 PER CENT. SN; 0.7 PER CENT. P). CAST IN SAND MOULD. (× 75.)

2B8 BRONZE 10 PER CENT. SN; 0.7 PER CENT P). (× 150.)

Slowly Cooled Sand-cast Billets of High- and of Low-phosphorus Bronzes

Results of tests on specimens from 5-in. dia. sand-cast billets in a low-phosphorus (9 per cent. Sn; 8.3 per cent. P) and a high-phosphorus (9 per cent. Sn; 1.5 per cent. P) bronze are shown in Figs. 10 and 11; curves for mean U.T.S./elongation (continuous lines) and experimentally determined stress-strain curves for sound specimens (broken lines) in Fig. 12 show a similar agreement to that discussed previously for other compositions. These specimens contain very little (α + δ) due to the slow cooling, but Cu_3P is present in small amounts in the 0.3 per cent. phosphorus alloy, and is much more extensive in the high-phosphorus bronze (Figs. 19 and 20). This difference accounts for the higher origin of the curve for the latter material, but there is little difference in the slope of the curves, so that, unlike the δ compound, Cu_3P appears to have little effect on the rate of work-hardening.

CONCLUSIONS

The variations in tensile strength and elongation which occur in cast bronzes of varying degrees of soundness, but of identical composition and constitution, are such that if U.T.S. is plotted against elongation for a series of test-bars, a curve is obtained similar in form to a normal load/extension curve for a sound specimen of that material. The variations in U.T.S. are caused by the attendant variations in extensibility, *i.e.*, by the amount of deformation which the various specimens can withstand before rupture occurs. The sounder a specimen is, the greater the extension it can undergo,

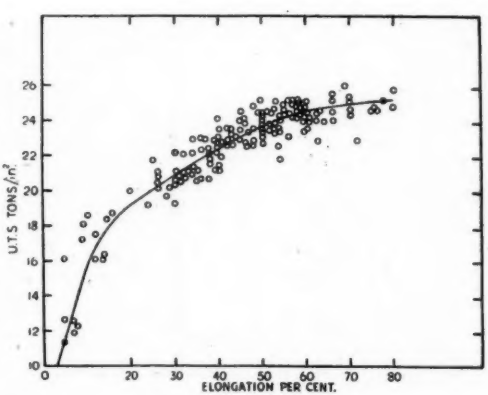


FIG. 10.—VARIATION OF U.T.S. WITH ELONGATION FOR 5-IN. DIA. SAND-CAST BILLETS OF LOW-PHOSPHORUS BRONZE (9 PER CENT. SN; 0.3 PER CENT. P).

Mechanical Properties of Bronzes

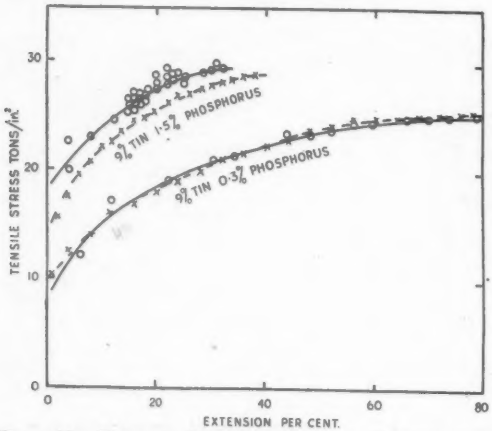


FIG. 12.—TENSILE STRESS/EXTENSION CURVES FOR BILLETS OF HIGH-PHOSPHORUS (9 PER CENT. SN; 1.5 PER CENT. P), AND LOW-PHOSPHORUS (9 PER CENT. SN; 0.3 PER CENT. P) BRONZE.

hence the greater the degree of work-hardning produced and the higher the breaking stress. This general relationship between U.T.S. and elongation applies to bronzes of various tin and phosphorus contents and to gunmetal. The characteristics of the U.T.S./extension curve vary with the amount of brittle phases (Cu_3P, δ) present in the microstructure of the bronze. Both compounds tend to increase the minimum stress required to produce measurable plastic deformation (*i.e.*, they tend to raise the yield point) while increase of δ also tends to steepen the curve, *i.e.*, to increase the rate of work-hardening of the material. Cu_3P does not appear to affect this property. A typical casting bronze has the highest yield point and highest rate of work-hardening when cast in a heavy chill mould (*i.e.*, wall thickness great in relation to ingot diameter) such as ensures rapid solidification and a high proportion of metastable ($\alpha + \delta$) or ($\alpha + \delta + Cu_3P$). These properties are lowest when such a bronze is annealed so as to absorb these compounds, while in slowly cooled sand castings the characteristics will be intermediate between those of the chill-cast conditions and annealed conditions, respectively.

Minor variations in tin or phosphorus content of bronzes which modify the proportion of compounds present have a similar effect to variations in the cooling rate. The presence of zinc, however, causes a decrease in yield point and an increase in work-hardening capacity, irrespective of its effect on the amount of compounds present.

Acknowledgment.—The experimental work which forms the basis of this Paper was carried out in collaboration with the Tin Research Institute, and the Author's thanks are due to Mr. K. Winterton, formerly of the Institute's staff for help in determining the stress-strain curves.

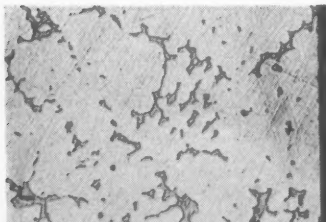


FIG. 16.—CAST IN 1-IN. DIA. CHILL MOULD.

FIG. 17.—CAST IN SAND.

GUNMETAL 88/10/2. (× 150.)

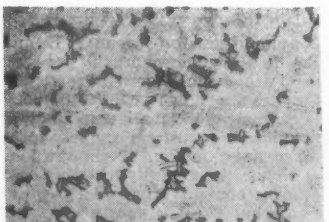


FIG. 18.—LOW PHOSPHORUS BRONZE (9 PER CENT. SN; 1 PER CENT. P). CAST IN SAND MOULD. (× 150.)

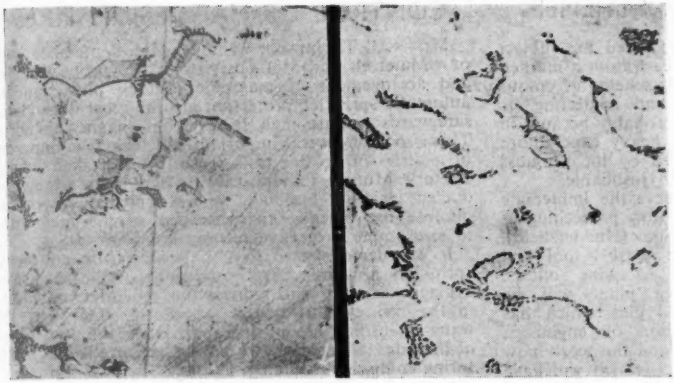


FIG. 19 (LEFT). — PHOSPHOR-BRONZE (9 PER CENT. SN; 0.3 PER CENT. P).

FIG. 20 (RIGHT) — PHOSPHOR-BRONZE (9 PER CENT. SN; 1.5 PER CENT. P).

CAST AS 5-IN. DIA. BILLET IN SAND. (× 150.)

A MOULDING PROBLEM

By "TRAMP"

Jobbing shops are often expected to produce first-class castings off inferior pattern equipment. Occasionally the patterns supplied are not constructed to favour the easy moulding of the casting and the moulder has to do a considerable amount of scheming before he can make his mould so as to be able readily to withdraw the pattern. Fig. 1 shows such a case; it is a jig or fixture required urgently by a neighbouring engineering works. The pattern was made as a replica of the casting, except that the portions, A and B, were loose so as to be more easily withdrawn. On first receiving the pattern, the moulder selected for the job said it was not possible to mould off the pattern, but it was pointed out to him that although the pattern was not ideal it could be moulded. A block of wood, C, was obtained from the pattern shop of width, D. This was to facilitate the ramming of the job and to form the joint of the mould.

The pattern was placed on a true board with block, C, in position, and rammed in the usual way. The box was then rolled over and the block, C, removed. The joint was next dusted with parting powder and the portion of the mould below line, EF, rammed—this being reinforced by a wire frame extending back into the pocket formed by the block, C, just as in core-making practice. The main joint was then parted and a top box placed on and rammed, care being taken that it was a good fit. This box was then lifted and the portion, A, of the pattern withdrawn and this part of the mould dressed off. The top box was returned to position and the whole rolled over and the other box lifted together with the pattern, thus leaving the portion of the mould, C, and the loose pieces, B, *in situ* on the remaining box.

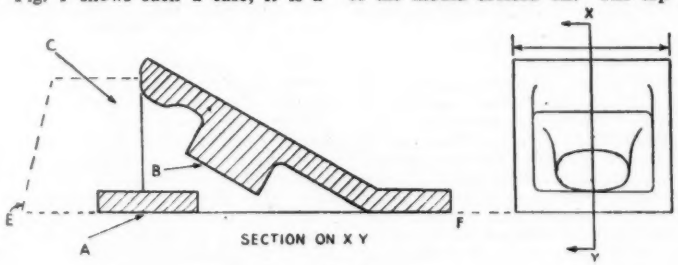


FIG. 1

The loose pieces being removed, the pattern was extracted from the original box to be rammed and a runner cut into the flange. The mould was then returned to its position and clamped to the other box and the job cast. The resultant casting was in every way equal to one made from a more expensive pattern equipment, necessitating a core box to remove the interior, and is an example of when the shell is still required in the jobbing foundry.

INDUSTRIAL COLOUR SCHEMES

A number of industrialists have tackled the subject of factory interiors, but in most cases wihout a marked degree of enthusiasm, confining their scheme of colour treatment to walls or machinery and neglecting to embrace the workshop as a whole, probably because in the absence of experience the very heavy expenditure and temporary disruption occasioned by the progress of the work may not have appeared justifiable.

It is therefore interesting to observe the immediate effects of a planned colour scheme now proceeding at the main works of David Brown & Sons (Huddersfield), Limited. All that group's seven works—tool and machine shops, foundries, forges, drawing offices, administration blocks and printing plant—will be decorated in a carefully considered plan which has been worked out in a consultation of engineers, psychologists and paint specialists, and the work now in hand at the extensive Park Works (which will have taken a year to complete) will act as a guide in the schemes for the other factories.

Considerations of the Scheme

Broadly, the considerations of the scheme were: (1) Elimination of the drab appearance of machines by enamelling them in light hues; (2) prevention of eye strain by provision of light-reflective colours on walls, ceilings and fixtures; (3) establishment of a more cheerful atmosphere by the blending of these colours; (4) improvement of visability, and (5) by relieving the monotony of drab colours and whitewashed walls, to reduce accident proneness, and to increase production—to provide physical, mental and social advantages.

Walls, ceilings, stanchions and overhead cranes are painted "semi-alert" cream with, on occasion, a dado of reseda green to reduce distance, machines are enamelled cream and green with "alert" orange on operational points, and service boxes and casings for power, water and compressed air are picked out in orange. In the forges and foundries the predominant hues will be yellow, green and aluminium.

The effect on "seeing" conditions, as distinct from the actual intensity of illumination, is marked, and the appearance of the shops is immeasurably brighter and more cheerful. White lines on the shop floors to demarcate gangways assume a new importance, and are well defined and somewhat broader for added decorative interest.

Plant maintenance gangs have already benefited by the decorator's art, for the operator takes a renewed pride in his machines and in his care of the enamelled finish includes a fresh consideration for the working parts.

CERTAIN ENGINEERING and metallurgical problems had to be solved before atomic energy could be used for industrial purposes, and it would take time before use was made of atomic energy in industry, said Prof. M. L. Oliphant, of Birmingham University, addressing the Liberal Party Council.

CONTROL OF MAGNESIUM FIRES

Mr. N. J. Thompson, writing in the September issue of "Materials and Methods," states that proper spacing and arrangement of magnesium stock plus standard automatic sprinkler protection are the most dependable safeguards against high losses from magnesium fires. This is one of several important conclusions coming out of a series of 16 fire tests recently undertaken by the Factory Mutual Laboratories. The tests were conducted inside a building, and the purposes were to disclose the burning characteristics of the metal and to re-examine protective recommendations.

It was demonstrated that the water from automatic sprinklers absorbs a large proportion of the heat from a magnesium fire and reduces the general temperature in the room. This occurs despite the fact that the water intensifies the burning and hastens the destruction of the pile. The general room temperature is less under sprinkler discharge than if the fire is allowed to burn without any attempt to extinguish it.

Sprinkler protection was also shown to be capable of confining a fire to a single pile, and to prevent structural damage to buildings and to ordinary combustible materials as close as 5 ft. to a fire involving 150 lb. of magnesium. Without sprinkler protection, a fire involving the same amount of magnesium will ignite combustibles at a lateral distance of 10 ft., and at considerably greater vertical distances.

Even when well away from walls and partitions, a fire in 600 lb. of castings, and probably considerably less, would cause ultimate complete destruction of an unsprinklered and otherwise unprotected plank-on-timber building. Other piles of magnesium castings 4 ft. away from such a burning pile would not become involved if under sprinkler protection.

Burning magnesium on contact with concrete causes violent spalling, which scatters the fire. A similar explosive action occurs when molten magnesium drops into any pools of water which may collect on an uneven floor. Both of these factors contribute considerably to the violence of a magnesium fire but can be largely eliminated by covering the concrete with a sufficiently thick layer of porous, non-combustible material, such as sand or cinder.

Storage in a basement or similar sub-grade space should be avoided because of the difficulty of venting and relieving pressures produced by contact of water with molten metal and by explosions in hydrogen-air mixtures. Storage on grade floors with no space below is advisable. Based on extent of floor damage in the tests involving only a ton of magnesium, it is probable that fires in larger quantities would produce holes, even in a reinforced concrete floor, and permit burning metal to drop through.

IT IS 50 YEARS since the existing company of A. & J. Main & Company, Limited, structural engineers, etc., of Glasgow, took over the assets and business of the firm which had previously carried on under the same name.

INFLUENCE OF RESIDUAL ELEMENTS ON THE PROPERTIES OF WHITEHEART MALLEABLE CAST IRON

The following is the discussion of "Influence of Raw Material on the Properties of Whiteheart Malleable Cast Iron with Special Reference to the Influence of Residual Elements," by a sub-committee of the technical advisory panel to the Directors for Iron Castings, Ministry of Supply. The Paper was presented at the annual conference of the Institute of British Foundrymen, at Birmingham, in June of this year. A summary of the Paper appeared in the October 10 issue of the FOUNDRY TRADE JOURNAL.

MR. T. MAKEMSON said he felt that the committee had carried out all that was wanted of them and even more. The Iron and Steel Control was more than satisfied with the work done by the panel. The panel was formed mainly with the idea of providing a guide in regard to the use of raw materials and very definite terms of reference were put forward. But when the planning committee was formed, and it produced its plan, he was appalled by its magnitude and the fact that it looked as if a long time must elapse before a report could be prepared. The report was not actually finished for about three years but in a much shorter time the committee accomplished a great deal of work which had been very helpful in the control, guidance and allocation of raw materials. Quite apart from the immediate object of the committee he believed it had provided a great deal of fundamental information which would be of assistance to every worker in the field of white heart malleable castings. The war made calls upon the malleable industry which it had never known before, not only in production—production for two years was 3,000 tons a week—something approaching double the figure it had known before—but also in the kind of jobs required. That needed something technically very much in advance of anything the industry had been called upon to do, either in black heart or white heart. The industry responded nobly and gave all that was required of it. Mr. Makemson said he was a great believer in the future of the industry. There was a lot to be said for malleable, and he believed it would play an even greater part in engineering construction than it had done in the past. The report had contributed something very important to the technical side of the malleable trade. He expressed thanks on behalf of the Iron and Steel Control to the members of the committee, which consisted, he added, of most of the leading technologists in the malleable field. The Control was also grateful to the British Cast Iron Research Association and Mr. Morrogh and his colleagues for carrying out the investigation.

Erratic Results

DR. A. L. NORBURY said he thought that one of the chief conclusions which should be drawn after studying the results in Figs. 2 to 14 was that there was some factor which was making the results very erratic and was largely obscuring the effects of the added elements.

He thought that the individual values, through which the curves were drawn, should have been included in those figures. A lot of the "wobbles" were just "wobbles" and not actual changes in direction.

The factor which was causing the irregular results was probably "mould conditions," due to the effects of varying amounts of mould gases entrapped in the metal. He was not suggesting that the test-bars had been badly moulded. The effect was more or less inevitable in a green sand mould, but it made one think that if some economically practicable method of moulding could be devised, which obviated mould gas effects, a great improvement in the mechanical properties of the material would result.

The sub-committee had realised at the outset that erratic results were being obtained and had achieved somewhat better consistency by altering the design of the runners and feeders to that in Fig. 1. It had, however, not been possible to investigate that aspect thoroughly since that would have delayed unduly the main investigation.

Another conclusion which he thought should be drawn was that the repeated blow Charpy test results in the Paper had given more useful information than the strength and malleability tests. Consequently the former type of test should be further investigated with the object of developing a standard shock-resistance test for malleable iron. It was well known that the present bend and elongation tests could be misleading. For instance, a high bend value was called for, but malleable iron was rarely required to bend in service. The high bend value was only required as an indication that the metal would have good shock resistance. Furthermore, in the case of white heart, since the attainment of a high bend value usually involved some sacrifice of the yield point value, the net attainment was not necessarily metal with the highest resistance to shock and deformation. In Figs. 2 to 14 the term "Charpy Impact Value" was used as a label. That might be misleading since the test was not a standard notched bar Charpy test. The term "Repeated Blow Charpy Test" was better. The distances between centres should be stated.

Toleration of Phosphorus in Whiteheart

The important question of how much phosphorus could be tolerated in whiteheart was unfortunately left rather undecided by the results in the Paper. The impact results in Fig. 11 suggested that increasing the phosphorus content from 0.05 to 0.10 per cent. had little or no effect on the brittleness. The impact results in Fig. 12, however, suggested that the same increase in phosphorus content had a marked embrittling effect.

Influence of Residual Elements

On an independent set of similar test-bars Dr. Norbury had obtained very similar results to those in Fig. 12, and on a further, still earlier set of bars Mr. Timmins and himself had also obtained the Fig. 12 type of effect. Consequently, the balance of evidence was that the true picture was between Figs. 11 and 12, but was nearer to Fig. 12 than to Fig. 11.

The effect of boron in Fig. 8 was noteworthy and very interesting. In that connection it should be remembered that molten cast iron could dissolve metallic boron from borax in slag.

MR. H. MORROGH agreed it would have been better to indicate the actual values on the curves. It was highly probable that many of the kinks which had been indicated had no relation to the effects of the residual elements at all. It should, however, be noted that the actual results plotted were average values of several such results. He agreed that the Charpy test was a useful one and could profitably be developed further for whiteheart malleable as it lent itself to such tests with unmachined test-pieces. It was true it was a repeated Charpy impact test and bore no relation to any other standard method of Charpy impact test such as used on the Continent. He agreed that phosphorus had a pronounced embrittling effect. He was unable to explain the difference in the trend of the graphs shown in Figs. 11 and 12. As investigators they were quite unable to explain the embrittling effect of the phosphorus.

MR. A. E. PEACE said that there were different melts and a slight difference in the chemical composition of the two groups. In the first group the silicon was lower and the sulphur was higher than in the second group and that might have contributed to the results, and which might have been thought to iron out otherwise the effect of the phosphorus.

Doubtful Soundness of Test-bars

MR. J. ROXBURGH congratulated the committee on the excellence of their work and the conclusions drawn as the result of it. From the practical standpoint he thought there might have been some suspicion about the soundness of the test-bars from the manner in which they were fed and run. The diagram showed the two bars joined together by two feeders with the runner in between. Some time ago, in collaboration with the laboratory, he found with certain test-bars very small skin "pulls" occurring which resulted in the lowering of the physical condition of some of the bars. He wondered whether the committee had any evidence of that in their examination of the bars. One of the conclusions of the committee was that copper in amounts up to 0.7 per cent. had no adverse influence on the strength of the larger sections. He wondered whether the committee had come to any conclusion regarding any percentage of copper which might impart beneficial influence. As to the amount of phosphorus in whiteheart he believed it was fairly well known that whiteheart was manufactured with phosphorus above 0.1 per cent. He noticed that no information was obtained on founding properties such as fluidity, "life" and susceptibility to give porosity. Though he realised the scope of the Paper was limited he felt such information would have been of great importance to the malleable industry. As was well known, certain defects occurred in castings which were quite often due to hard cores, contraction or interference by the melting. It would be of great interest and benefit to know if the committee could give some attention to that aspect.

MR. PEACE said Mr. Roxburgh was quite right in pointing out the question of the test-bars and the possible graphitising defects. In his experience there was a cold lap which usually occurred in the centre of the bar where the two streams of metal came together. That might lead to some exclusion of gas. With the particular bars which were the subject of test, prior to the tests being made, samples were cast with wooden patterns. After investigation the method was adopted which was likely to produce the soundest bar, but even so there were bars discovered in the heavy sizes which showed some microporosity. In no case was a cold lap discovered. There might be cases of porosity.

Copper Effect upon Mechanical Properties

MR. MORROGH said he believed he interpreted the results correctly by saying that they found no evidence that copper had any beneficial effect upon the mechanical properties. With regard to the remaining point that whiteheart malleable with above 0.1 per cent. phosphorus had been produced, the committee had been aware of that, but the investigation was begun to deal with certain problems of a very special critical nature, and they were anxious to uncover the slightest bad effect which any element might have. He had no doubt that many castings with more than 0.1 per cent. of phosphorus would be satisfactory for service expected from them. With regard to fluidity and soundness tests it was regretted it was impossible to investigate along those lines in the time available, but he thought it would be wise to carry out a similar investigation on that aspect alone.

Effect of Titanium and Boron

MR. I. JENKINS added his congratulations to the subcommittee for an excellent Paper which was of very great practical value but also raised one or two fundamental issues. Although the practical nature had been stressed he was personally disappointed that the committee had not ventured their views on certain of the more fundamental aspects of the investigation because he was sure that they must have had many views on such matters. There were the effects of titanium and boron, for example. The effect of titanium in cast iron apparently was quite contrary to its effect in steel. In steel it was recognised as a stabiliser but in cast iron it was a graphitiser. Was it really the effect of the titanium or that of some product of titanium after its addition to the melt. Titanium has the property

of dissolving its own oxide. He put it forward for consideration, the possibility of titanium rejecting oxide from solution and the oxide providing small nucleii for subsequent graphitisation. It would be interesting to explore that theory. With regard to boron the increased stability of carbide in the cast iron might perhaps be due to the formation of the stable carbide of boron. On the other hand, boron also forms very stable compounds with silicon. Was it possible that the precipitation of such compounds with the removal from solution of the strong graphitising agent, silicon, accounted for the stabilising effect of boron additions? He put that forward for consideration because he felt that the condition in which residual elements existed in cast iron was most important from the point of view of counteracting their effect. With regard to the effect of the addition of oxidised material to the melt, he considered that the important point was the nature of the oxides retained in the melt after casting. In this connection it would be interesting to have vacuum fusion analysis of castings produced in this way. The same remarks apply to the tests in which the melt was treated with hydrogen prior to casting. Looking through the curves it was rather interesting to note that in so many cases there appeared to be almost mirror images, more especially for the $\frac{1}{4}$ and $\frac{1}{2}$ bars. Was there any significance in that or was it merely fortuitous?

MR. MORROGH said Mr. Jenkins had put forward some ideas which were worthy of perhaps deeper thinking than was possible just at that moment but he (Mr. Morrogh) would endeavour to deal with them. When titanium was reckoned to be a stabiliser he should ask—of what? Was it carbides? Dealing with cast iron one had to think differently in regard to titanium. It was an element which formed a stable carbide, but that in itself was a very powerful graphitiser. It was well known that the graphitising influence was not due to the influence of alloyed titanium. In that respect titanium behaved somewhat similar in manner to aluminium. It was almost certainly related to the conversion of the oxide content of the iron into another form; a form containing alumina or titanium oxide or zirconia. He would not like to be drawn too deeply into that theory. It was interesting but it seemed to involve the solution of titanium oxide. Titanium oxide probably completely lost its identity in the metal and therefore the theory seemed hardly tenable. He had not met the theory put forward with regard to boron though it was an interesting one. He put forward the point that if that were so one could take the reverse case, take the iron which had not had boron and added silicon. One would expect the silicon to have no graphitisation influence until the silicide had been formed. It was well known that this was not so. He was entirely in sympathy with Mr. Jenkins as to the oxygen in the melt. The investigators were certainly very alive to that important aspect of the problem. With regard to the form in which the oxygen was added he could not give any details, but the evidence they had did suggest, in the manner in which the material was melted, that the melt was saturated in every case with oxygen, and that an attempt was made to increase the oxygen reaction occurring with silicon and carbon.

Malleable Industry on Verge of New Era

MR. H. G. HALL, as a member of the committee, desired to add, with the permission of Mr. Gardom, a few things to the Paper. Certain rather definite conclusions had been drawn. He hoped the pig-iron manufacturers would read the Paper carefully. He believed that the malleable industry was on the verge of a new era and that technical advancement onwards would be very rapid. He was particularly anxious that pig-iron manufacturers should not allow the conclusions in the investigation to enable them to step up, or at any rate, to retain the residual elements in any quantity. The investigation was done on metal melted for a period of 7½ hrs. in an oil-fired crucible furnace, and the annealing cycle was relatively long. As a result he believed the effect of these elements had to some extent been ironed out and that any attempt that manufacturers made in the future to produce rapid and short cycle malleable might be offset to an extent not suggested in the report, by the presence of minute traces of residual elements. He suggested that those interested should obtain a copy of the main report and read it thoroughly. It would be well worth while. With reference to conclusion No. 15, he analysed statistically the physical properties in relation to the base irons used. Part of the melts were always cast before the addition of any residual elements. There were certain obvious differences in properties, on an average, between the metal obtained from the refined iron melts, and that from the hematite melts, but as he believed that differences of the same order could exist between melts from different hematites, he agreed to let conclusion No. 15 stand. He believed the influence of the base iron had been under-estimated and there should be much more investigation into that property.

Winding up the discussion the Chairman said, "As a pig-iron producer and having made many thousands of tons of refined iron all I can say is this after these investigations. Why don't you publish your specifications? We will work to them."

MR. H. MORROGH, replying on behalf of the Investigators and Planning Group, wrote that Dr. Hurst's comments upon the Paper were particularly important in so far as they indicated that troubles probably related to the presence of residual elements in cast iron did still occur. This observation was important in that it drew attention to a feature which had not, perhaps, been adequately emphasised in the Paper. The work referred to had been carried out in relation to trouble which was experienced in producing a particular type of casting during the war. For this reason the sections studied were similar to those occurring on this casting, and the annealing treatment applied was intended to represent the average type of annealing cycle applied to the material in commercial practice for the production of this casting. In doing this, the group planning the investigation had kept closely to the original object of the investigation, but some attempt was, of course,

Influence of Residual Elements

made to obtain some generally useful results. The annealing cycle which was used was relatively lengthy, and a lengthy annealing cycle, particularly when applied to thin sections, would tend to iron out any irregularities due to the presence of residual elements, or any other apparently inherent defects. It was undoubtedly true that under some conditions some of the residual elements which were studied could be harmful. There was no doubt, however, as Dr. Hurst had pointed out, that such troubles could be dealt with provided they were investigated thoroughly by the modern methods that were now available.

Written Contribution

DR. J. E. HURST wrote that the fact that he was a member of the sub-committee under whose general guidance this investigation was carried out, cannot detract from his expression of appreciation of the importance and magnitude of this work and the extreme thoroughness which characterised the whole investigation. The Paper as presented was in itself quite a lengthy document, and this was, in fact, an extract only of the main report. Those who had had access to the full report would know what a gigantic task was undertaken and how thoroughly it was done. In spite of the length of the Paper, he did not think it could have been effectively shortened without endangering the object the committee and the Ministry of Supply, who sponsored the investigation, had in mind in bringing these results to the notice of all those engaged and interested in the manufacture of malleable iron castings.

The conclusions will be considered and viewed from many angles in accordance with and in the light of individual experience in spite of the very important warning by the investigators and the committee that they relate only to the particular conditions under which the experiments were carried out. Although in the main and under these circumstances the conclusions as to the harmful effects of residual elements are negative, their presence cannot be completely ignored. In fact, this work, together with the knowledge of the increased liability of our raw materials to be contaminated with residual elements, can be taken as strongly supporting the value of exact knowledge of the nature and amount of such elements present in our raw materials. Fortunately, modern methods of analysis, particularly spectrographic methods, make these determinations comparatively simple and rapid, and the determination of practically all these elements need not be regarded as a formidable task to-day.

"Synthetic" Method of Approach

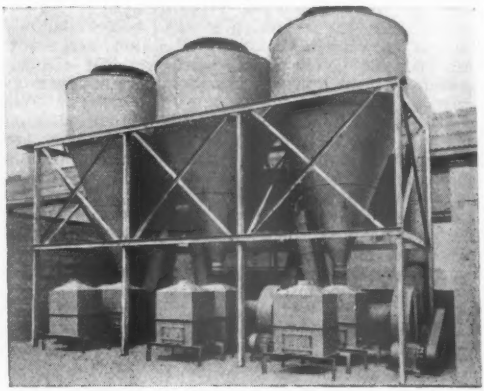
The committee have indicated that this work was undertaken in an attempt to discover causes or explanations of irregularities in the quality of regular malleable casting production. What might be termed a "synthetic method" of approach to the problem had

(*Continued at foot of next column.*)

DUST REMOVAL FROM CYCLONES

We illustrate, by courtesy of Dallow, Lambert & Company, Limited, of Leicester, a plant which they have installed at one of the works of Rolls-Royce, Limited.

As shown, there are three fans and cyclones serving various types of polishing machines. The fans handle



an approximate total air volume of 36,000 cub. ft. of air per min., and require 78 h.p. for driving purposes. The drive is transmitted from totally enclosed motors by means of "V" rope drives. The cyclones are of improved design with a special internal static settling device preventing undue swirling of dust and resultant heavy wear on the cone of the cyclone. The dust receptacles (two for each cyclone) are arranged so that a travelling electric elevating truck can be inserted under them, and take the container away complete for dust disposal.

(*Continued from previous column.*)

been adopted, and the influence of the various factors, residual elements, etc., had been explored by making up appropriate compositions for examination. The conclusions reached did not explain the difficulties encountered, the frequent failure to meet mechanical test requirements, and the frequency and irregularity of these incidents. Such difficulties were in fact encountered, and still happened even in the best regulated foundries. The opportunity of investigating and studying such occurrences at their onset and during their persistence did not arise. He did feel, however, that if such an opportunity could be found and investigated analytically with equal thoroughness, knowledge would be further increased to the advantage of the malleable casting industry.

INSTITUTE OF BRITISH FOUNDRYMEN

ELECTION OF NEW MEMBERS

At a meeting of the Council of the Institute of British Foundrymen, held at the Charing Cross Hotel, London, W.C.2 on October 16, the following were elected to the various grades of membership of the Institute.

FIRST LIST

As Subscribing Firm Member

Joshua Bigwood & Son, Limited, Wolverhampton, engineers and ironfounders (representative, W. Millington).

As Members

W. R. Blakeborough, works manager and engineer, J. Blakeborough & Sons, Limited, Brighouse; L. Brown, pattern-maker, and technical manager, Premo Pattern Company, Limited, Birmingham; L. K. Jenicek, assistant professor, Mining and Metallurgical Institute, Prague; J. J. Lavender, metallurgist, Josiah Guest & Sons, West Bromwich; W. C. Newell, metallurgical research chemist, British Iron and Steel Research Association; W. M. Philip, mechanical engineer, Paterson-Hughes Engineering Company, Limited, South Africa; C. Robertson, foundry director, Leyland Motors, Limited, Leeds; H. E. Robinson, assistant die foundry manager, Sterling Metals, Limited, Coventry; D. A. Smith, assistant general manager, Railway & General Engineering Company, Limited, Nottingham; T. H. Staffin, foreman, research laboratory, Allis-Chalmers Manufacturing Company, Wisconsin, U.S.A.; N. P. Wright, metallurgist, Bristol Aeroplane Company, Limited; D. Guthrie,* foundry consultant, Guthrie Adams & Company, Keighley.

*Transferred from associate.

As Associate Members

P. Aston, foundry foreman, William Cross & Son, Limited, West Bromwich; J. H. Barrett, works manager, Jarrow Metal Industries, Limited, Jarrow-upon-Tyne; K. L. Biswas, foundry superintendent, Indian Iron & Steel Company, Limited; W. H. Boardman, technical representative, Corn Products Company, Limited, London, W.C.2; C. F. Ford, foundry foreman, K. C. Productions, London, S.W.6; C. K. Gattrell, non-ferrous moulder, foreman, John Every (Lewes), Limited; F. J. Gill, engineer, inspector, David Brown & Sons (Huddersfield), Limited; W. D. Harrison, metallurgist, Jarrow Metal Industries, Limited; W. A. Holley, foundry foreman, Barnes & Pye, Limited, Norwich; H. Jarratt, ironfoundry manager, W. C. Holmes & Company, Limited, Huddersfield; C. P. King, metallurgical chemist, Ruston & Hornsby, Limited, Lincoln; C. W. Knot, works manager, Yorkshire Die Casting Company, Halifax; R. D. Langrish, manager of journals, Louis Cassier Company, Limited, London, S.E.1; E. V. Mathias, metallurgist, Imperial Chemical Industries, Limited, Billingham; S. Parker, iron moulder, foundry manager, Wilson & Mathieson, Leeds; G. A. Pearsall, technical representative, District Chemical Company, London, W.C.1; L. T. Shore, analytical chemist, Consett Iron Company, Limited; J. T. Shroff, technical student, Vickers-Armstrongs, Limited, Newcastle-upon-Tyne; R. H. Swift, assistant manager, North Eastern Iron Refining Company, Limited, Stockton-on-Tees; C. Thompson, ironfoundry foreman, W. C. Holmes & Company, Limited, Huddersfield; A. Whiles, foreman moulder, Aluminium Bronze Casting Company (Balham), Limited.

As Associates (over 21)

P. Bagley, foundry foreman, Cannon Iron Foundries, Limited, Deepfields; R. N. Biswas, apprentice, Kulti General Works, Bengal, India; L. G. Cornes, assistant foundry metallurgist, Belliss & Morcom, Limited, Birmingham; W. R. Lumley, moulder, Noble & Lund, Limited, Gateshead-upon-Tyne; E. S. Nichols, pattern-maker, Crofts Associated Industries, Limited, Bradford; K. Porter, apprentice metallurgist, W. C. Holmes & Company, Limited, Huddersfield.

As Associates (under 21)

J. H. F. Evans, pattern-maker, Simplex Electric Company, Limited, Oldbury; F. B. Fletcher, laboratory assistant, Stanton Ironworks Company, Limited, Nottingham; D. Garmonsway, metallurgist, Wolsingham Steel Company, Limited; N. G. Rawlings, moulder, Langley Alloys, Limited, Slough; J. Redmayne, apprentice pattern-maker, "Wilson" Forge (1929), Limited, Bishop Auckland; G. H. C. Whitley, junior metallurgist, Belliss & Morcom, Limited, Birmingham.

SECOND LIST

As Subscribing Firm Members

Burn & Company, Limited, Calcutta, India, ironfounders (representative, G. E. Hale); Indian Iron & Steel Company, Limited, Calcutta, ironmasters and ironfounders (representative, S. Hague).

As Members

J. Cormack, pattern-maker, Consolidated Pneumatic Tool Company, Limited, Fraserburgh; T. C. Disley, foundry manager, Harland & Wolff, Limited, London, S.W.1; E. F. Farren, foundry foreman, Jessop & Company, Limited, Calcutta; C. A. M. Gray, assistant manager, Harland & Wolff, Limited, London, S.W.1; A. W. Lee, Sales Manager, Norton Grinding Wheel Company, Limited, Welwyn Garden City; T. E. Parkinson, secretary, Council of Ironfoundry Associations; W. A. Murray,* engineer, W. A. Murray & Company Glasgow; W. F. Sievewright, manager, International Meehanite Metal Company, Limited, London, S.W.1; F. G. Williams, works manager (retired); J. P. Wilson,* ironfounder and engineer, Wilson Bros., Pipe Fittings, Limited, Glasgow.

*Transferred from associate member.

As Associate Members

J. Allan, draughtsman, L. Sterne & Company, Limited, Glasgow; C. S. Gildawie, assistant foreman moulder, M. Cockburn & Company, Limited, Falkirk; J. F. H. G. Goffart, chief engineer, Fonderies Nestor Martin, Brussels; J. Henry, equipment manager, Ren-

frew Foundries, Limited; A. P. Horne, charge hand, Westminster Engineering Company, Limited, Willesden; J. B. McGregor, foundry manager, T. White & Sons, Limited, Glasgow; A. F. Stevens, technical assistant to foundry manager; M. M. Stubbs, technical manager, Watford Foundry Company, Limited; H. Wilson, foreman pattern-maker, Renfrew Foundries, Limited; O. E. Windsor, pattern-maker, Globe Engineering Works, Cape Province.

As Associates (under 21)

P. G. Thompson, laboratory assistant, Davey, Paxman & Company, Limited, Colchester; Miss B. Whalley, student, City & Guilds College, London.

THIRD LIST

As Subscribing Firm Member

Partridge Jones & John Paton, Limited, Risca, Mon., iron, steel and brass founders (representative, H. H. Sullivan).

As Members

G. L. Jones,* metallurgist, Tubal Cain & Company, Cardiff; E. Ohman, chief metallurgist, Wedaverken, Sodertalje, Sweden; A. Whiteley,* managing director, Glanmor Foundry Company, Limited, Llanelly.

*Transferred from associate member.

As Associate Members

C. H. C. Baldwin, technical representative, Universal Grinding Wheel Company, Limited, Stafford; F. W. Bates, foundry planning engineer, Humber, Limited, Coventry; F. G. Bridgart, pattern-maker, S. Jellyman, Limited, Cannock; L. C. H. Griffiths, schoolmaster, Wirksworth Grammar School; F. L. Harding, assistant foundry foreman; E. Kellet, charge hand core-maker, Ley's Malleable Castings Company, Limited, Derby; V. Kondic, lecturer in metallurgy department, Birmingham University; F. Lowe, time study engineer, Coneygre Foundry, Limited, Tipton; G. J. Morgan, foundry manager, Partridge Jones & John Paton, Limited, Newport, Mon.; J. N. Morris, foundry manager, McKechnie Bros., Limited, Birmingham; F. Pollard, engineering director, F. Pollard & Company, Limited, Leicester; W. C. Ray, foundry manager, McKechnie Bros., Limited, Birmingham; D. E. Rudall, metallurgist, Tubal Cain & Company, Cardiff; K. C. Sharpe, managing director, Dickin Bros. & F. Sharpe; J. E. Spear, assistant to managing director, John Harper & Company, Limited, Willenhall; H. L. Thorne, technical representative, Phosphor Bronze Company, Limited, Birmingham; B. H. Tingle, production inspector, C. & B. Smith, Limited, Wolverhampton.

FOURTH LIST

As Subscribing Firm Member

Knowsley Cast Metal Company, Limited, Manchester, founders and engineers (representative, G. F. Mundell).

As Members

A. Blackwood, manager, Entwisle & Gass, Limited, Bolton; E. T. Eddlestone, foundry manager, Eddlestone & Company, Limited, Burnley; W. Holden, partner,

(*Continued at foot of next column.*)

FORTHCOMING EVENTS

(Secretaries are invited to send in notices of meetings, etc., for inclusion in this column.)

OCTOBER 26.

Institution of Chemical Engineers (N.W. branch):—Joint meeting with Liverpool section S.C.I. "Some Aspects of Adsorption by Activated Charcoal," by L. J. Burrage. At Liverpool.

OCTOBER 30.

Institute of Welding:—Sir William J. Larke Medal Paper: "Welded Dragline Booms of 150 ft. Length," by H. Gottfeldt. At the Institution of Civil Engineers, Great George Street, S.W.1, at 6 p.m.

OCTOBER 31.

Royal Statistical Society:—*Industrial Applications Section (Sheffield group)*:—"The Control of Coke Quality by the Shatter Test," by J. Bradwell. At the University, St. George's Square, Sheffield, at 6.30 p.m.

NOVEMBER 1.

Keighley Association of Engineers:—"Fabricated Machines," by F. Koenigsberger. At Devonshire Buildings, Devonshire Street, Keighley, at 7.30 p.m.

NOVEMBER 2.

Manchester Association of Engineers (Students' section):—Visit to Leyland Motors, Limited.

Institute of British Foundrymen

OCTOBER 26.

Falkirk section:—"Control in a Mechanised Jobbing Steelfoundry," by D. Brown At the Temperance Café, Lint Riggs, Falkirk, at 6 p.m.

East Midlands branch:—"Sandstorm Secrets," by J. Blakeborough. At the Technical College, Leicester, at 7 p.m.

OCTOBER 30.

London branch:—"The Production of High Quality Steel" (Hadfields film), presented by W. H. Salmon. At the Gaumont British Picture Corporation, Film House, Wardour Street, London, W.1, at 7.30 p.m.

(*Continued from previous column.*)

Holden & Duckworth, Clayton-le-Moors; R. G. Norris, independent consultant; F. S. Yates,* chief chemist and metallurgist, Craven Bros. (Manchester), Limited.

*Transferred from associate member.

As Associate Members

S. O. Bricknell, moulder, J. Pickles & Son (Engineers), Limited; G. F. Buxton, foundry manager, Furnival & Company, Limited, Reddish; T. Clark, moulder, D. Owen & Sons (Monton), Limited; D. A. Cryer, pattern-maker, Hargreaves & Gott, Limited, Rochdale; H. Freeman, charge hand moulder, Lupton & Place, Limited, Burnley; J. Gardner, general secretary, Amalgamated Union of Foundry Workers; H. Gaulter, foreman pattern-maker, P. R. Jackson & Company, Limited, Salford; H. Hazlehurst, foundry foreman, Henry Wallwork & Company, Limited, Manchester; E. Palmer, moulder and core-maker, P. R. Jackson & Company, Limited, Salford; A. Smith, foreman moulder, Butterworth & Dickinson, Limited, Burnley; J. T. Sneyd, foreman, Entwisle & Gass, Limited, Bolton; T. Tooth, foreman, Dean & Lowe, Limited, Stoke-on-Trent; R. C. W. Turner, moulder, Goodbrand & Company, Limited, Stalybridge; C. M. G. Wallwork, engineer, Henry Wallwork & Company, Limited, Manchester; R. O'Brien,* technical assistant, Matthew Swain, Limited, Manchester; F. Unsworth,* pattern-maker, metallurgist, Dobson & Barlow, Limited, Bury.

* Transferred from Associate.

CHANGING OUTLOOK FOR METALS

By "ONLOOKER"

If during the war the non-ferrous metal industry developed a price stability complex, due to the fact that, following the pegging of quotations in December, 1939, no changes were made until the middle of 1945, it now finds itself facing a very different state of affairs. Lead and zinc were the first to break the spell of fixed prices and they moved in June last year, but it became obvious soon after this that the price structure of copper was threatened, and a spirit of gambling against a possible rise in values made its appearance. Discontent with the ceiling prices imposed by the U.S. government became evident in the States, and the producers contended that it was impossible for them to work without loss, while it became obvious that the British Ministry of Supply could not secure supplies of non-ferrous metals at a level in line with the official quotation ruling in Britain. With the advent of 1946, a wave of optimism regarding the prospects for metal prices was evident, and in April a sharp rise took place, only to be followed by another one less than two months later. In April, when copper, lead and zinc advanced in value, aluminium was drastically reduced, while late in September the rise in tin, awaited for many weary months, was announced at £80 10s. per ton. One way and another, therefore, the present year has turned out to be a period of ups and downs, although it must be admitted that on the balance the trend has been towards a higher level.

Quarterly Price Changes?

There has, in fact, been a complete change of heart during 1946, and those who clamoured loudest for fixed prices to be continued, even though this meant imposing a tax on the British public, are now upset if the bull market shows signs of flagging. Since the Ministry keep their own counsel about how and when the changes in value shall take place, and the trade can only receive guidance from watching the American export quotations, it is not surprising that rumour and surmise are rife. One popular idea that has achieved widespread acceptance this year is the suggestion that the Ministry make up their metal accounts quarterly and that changes may be expected accordingly. It will be remembered that alterations in value were made on April 8 and July 1, and a great many people awaited October 1 in the full expectation that a further move would be made on that date. So strong was this feeling that when this date arrived without any announcement being made, the more ardent bulls of the non-ferrous metals felt they had been cheated out of their due! This kind of mental attitude savours very much of the atmosphere created by a bazaar raffle or a lucky dip, but it is difficult to see how it can be eradicated so long as the present system of bulk purchasing and price change by announcement continues. What happens, of course, is that the buyers tend to book too far ahead so as to avoid paying the higher price while the sellers hold back in an attempt to secure the very best possible return on their products. It is indeed a wretched state of affairs, but it is to be feared that when the course of values turns downwards and sellers predominate, the position will be even more unpleasant than it is to-day.

In Britain signs are not wanting that the sands are running out so far as the system of Government purchasing is concerned, one pointer being rubber, in in which we may well see a free market established early next year. In the case of rubber, the dramatic and relatively rapid transformation from famine to glut has forced the Government's hand and it certainly looks as if the only way to handle a difficult situation successfully is to allow a return to normal trading. In the case of the non-ferrous metals, matters are not quite so easy, for there is a serious shortage aggravated, so far as this country is concerned, by the Ministry of Supply's departure from the operation of long-term buying arrangements. On the other hand, voices are raised to suggest that so long as we struggle along under the handicap of Government purchasing, we shall never get anywhere, until such time, of course, as all the metals are in over supply. In the case of tin it has been estimated that in another two or three years there will be enough, and to spare, and the working party has to decide, among other matters, how to deal with this problem. The most obvious way out would be to re-establish a futures market in London, and probably this is what will happen. With copper, lead and zinc the duration of the lean period is not easy to estimate, but the chances are that improvement will come with greater suddenness than is generally anticipated. It is pretty certain that were the free market opened now prices would advance sharply for a short time, but that a setback would follow. And in the meanwhile supplies would begin to flow to Britain.

A GOLDEN JUBILEE

Although the National Brassfoundry Association has been known under its present title for only three years, the organisation has, in fact, been in existence since 1897.

In connection with the celebration of the golden jubilee, next year, the Association is compiling a small book detailing some of the history of the trade. Unfortunately, however, there are no records in the possession of the Association for the period prior to 1914. It is pointed out that brassfounding is a very ancient craft industry, being mentioned in Genesis, iv. 22. The period to be covered obviously is extensive. The Association therefore appeals to readers who can contribute interesting data, and thus assist in the research into the past. Great care will be taken of books, documents, photographs, and so on. These will be returned, and their use duly acknowledged.

It is emphasised that the brassfounding industry is not so much an industry for casting brass in foundries, as for the manufacture of goods in the category known as "Brassfounding," by die casting, hot pressing, cold stamping, or any other of the known processes.

PIG-IRON AND STEEL PRODUCTION IN GREAT BRITAIN

The following particulars relating to pig-iron and steel production in Great Britain have been extracted from the Statistical Bulletin for September, 1946, issued by the British Iron and Steel Federation. Table I gives the production of pig-iron and ferro-alloys in August, with the number of furnaces in blast at the end of the month; Table II, production of steel ingots and castings in August; and Table III, deliveries of alloy and non-alloy finished steel. Table IV summarises the activities of the steel industry as a whole during the six months ended August, 1946.

TABLE I.—*Production of Pig-iron and Blast-furnace Ferro-Alloys.* (*Thousands of Tons.*)

District.	Furnaces in blast, 31.8.46	Weekly Average Production, August, 1946. Hematite.	Basic.	Foundry.	Forge.	Ferro-alloys.	Total.
Derby, Leics, Notts, Northants, and Essex	23	—	13.2	17.2	1.3	—	31.7
Lancs (excl. N.-W. Coast), Denbigh, Flints and Ches Yorkshire (incl. Sheffield, excl. N.-E. Coast)	5	—	5.6	—	—	0.6	6.2
Lincolnshire	13	—	22.0	—	—	—	22.0
North-East Coast	26	5.4	29.1	0.4	—	1.7	36.6
Scotland	10	0.6	9.2	2.1	—	—	11.9
Staffs, Shrops, Worcs and Warwick	8	—	5.6	1.2	—	—	6.8
S. Wales and Monmouthshire	7	2.4	13.7	—	—	—	16.1
North-West Coast	6	12.4	—	1.6	—	—	14.0
Total	98	20.8	98.4	22.5	1.3	2.3	145.3
July, 1946	95	21.7	98.3	23.0	0.8	3.2	147.0
August, 1945	97	20.1	81.7	20.8	0.7	1.9	125.2

TABLE III.—*Deliveries of Alloy and Non-Alloy Finished Steel.* (*Thousands of Tons.*)

Product.	Weekly average 1944.	1945.	1945. August.	1946. July.	1946. August.
Non-Alloy Steel:—					
Heavy rails and sleepers	6.5	7.1	6.8	8.4	8.9
Plates	30.8	26.4	23.4	26.0	23.8
Other heavy products	38.2	33.1	26.1	28.9	29.9
Light rolled products (excl. wire rods and alloy-steel bars)	46.2	41.9	33.0	45.5	44.2
Ferro-concrete bars	2.1	1.8	2.7	3.1	2.9
Cold rolled strip	4.2	4.0	3.5	4.3	4.0
Bright steel bars	4.9	3.9	3.0	4.2	4.3
Sheets, incl. coated	21.2	20.2	14.2	20.9	20.1
Tin, terne and black-plate	10.0	9.5	7.2	10.2	7.4
Tubes and pipes	12.3	10.9	9.2	12.4	12.9
Steel wire	12.2	10.2	8.6	11.0	10.5
Tyres, wheels and axles	2.6	2.5	2.5	3.1	2.8
Forgings	5.9	5.3	4.3	4.9	4.6
Castings	5.1	4.1	3.4	2.5	3.0
Total	202.2	180.9	147.9	185.4	179.3
*Alloy steel**:—					
Plates	1.9	1.1	0.7	0.1	0.1
Tubes and pipes	0.6	0.3	0.2	0.2	0.4
Bars, sheets, strip and wire	5.6	3.0	2.3	2.2	2.5
Forgings	5.0	2.2	1.6	1.5	1.4
Castings	1.7	0.9	0.8	0.4	0.6
Total	14.8	7.5	5.6	4.4	5.0
Total U.K. production†	217.0	188.4	153.5	189.8	184.3
Less Intra-Industry conversion	24.5	17.8	12.7	13.2	11.6
Total net U.K. deliveries	192.5	170.6	140.8	176.6	172.9
Add Deliveries of imported finished steel	5.0	1.0	1.5	—	—
Total deliveries of finished steel	197.5	171.6	142.3	176.6	172.9

* Excluding high-speed steel.
† Includes finished steel produced in the U.K. from imported ingots and semi-finished steel.

TABLE II.—*Production of Steel Ingots and Castings.* (*Thousands of Tons.*)

District.	Weekly Average Production, August, 1946. Open-hearth. Acid.	Open-hearth. Basic.	Bessemer.	Electric.	All other.	Total.* Ingots.	Total.* Castings.	Total ingots and castings.
Derby, Leics, Notts, Northants and Essex	—	—	(Basic) 7.0	0.9	0.2	7.7	0.4	8.1
Lancs (excl. N.-W. Coast), Denbigh, Flints and Ches Yorkshire (excl. N.-E. Coast and Sheffield)	0.8	16.0	—	0.4	0.3	16.7	0.8	17.5
Lincolnshire	—	26.1	—	—	0.2	26.1	0.2	26.3
North-East Coast	2.1	44.1	—	0.6	0.3	46.0	1.1	47.1
Scotland	5.6	30.0	—	0.5	0.6	35.2	1.5	36.7
Staffs, Shrops, Worcs and Warwick	—	10.7	—	0.4	0.6	10.8	0.9	11.7
S. Wales and Monmouthshire	5.6	28.6	(Basic) 3.2	0.5	0.1	37.8	0.2	38.0
Sheffield	7.0	20.5	—	5.6	0.5	32.2	1.4	33.6
North-West Coast	0.3	2.0	(Acid) 4.6	—	0.1	6.9	0.1	7.0
Total	21.4	178.0	14.8	8.9	2.9	219.4	6.6	226.0
July, 1946	21.8	176.4	17.7	7.7	2.5	220.6	5.5	226.1
August, 1945	17.4	141.2	15.1	8.4	3.7	178.4	7.4	185.8

* Including alloy.

(Continued at foot of facing page.)

INTERNATIONAL TRADE AND EMPLOYMENT

UNITED NATIONS' CONFERENCE

The Preparatory Committee of the International Trade and Employment Conference held its first meeting at Church House, Westminster, on October 15. The business of the Preparatory Committee is to draw up an annotated draft agenda, including an international convention, for consideration by the Trade and Employment Conference, which is to be held next year. The decision to call a Trade and Employment Conference was made on February 18 this year, by the Economic and Social Council, during its first session, when it adopted a United States resolution to "call an international conference on trade and employment for the purpose of promoting the expansion of production, exchange and consumption of goods." It was then agreed that the agenda of this conference should cover the fields of full employment, commercial policy, restrictive business practices, inter-governmental commodity arrangements and the setting up of an international trade organisation.

At the same time, the Economic and Social Council decided to establish a preparatory committee for the conference to draw up its draft agenda and convention. In carrying out its task, the Preparatory Committee is to take into account, suggestions which may be submitted to it by the Economic and Social Council, or directly by members of the United Nations. The Committee will report to the Economic and Social Council and recommend the date and place of the main conference. At the second session of the Economic and Social Council in New York on May 23, the secretary-general, Mr. Trygve Lie, announced that arrangements were being made for the Preparatory Committee to meet in London on October 15, "so that a further constructive step may be taken towards freeing the productive forces of the world."

As a basis for these preliminary discussions, the Economic and Social Council suggested that the agenda for the main conference include the establishing of international agreements relating to:—(i) The achievement and maintenance of high and stable levels of employment and economic activity; (ii) regulations, restrictions and discriminations affecting international trade; (iii) restrictive business practices; (iv) inter-governmental commodity arrangements. The establishment of an international trade organisation, as a specialised agency of the United Nations, having responsibilities in the fields of (ii), (iii) and (iv) above, is also to be discussed.

The Preparatory Committee has been asked by the Council, when considering these items, to take into account the special conditions which prevail in countries whose manufacturing industry is still in its initial stages of development, and the questions arising in connection with commodities subject to special adjustment problems in international markets. This meeting provides the first post-war opportunity of discussing economic and trade problems affecting the world at large on a comprehensive basis.

The following countries are represented:—Australia, Belgium-Luxemburg, Canada, Chile, China, Cuba, Czechoslovakia, France, India, Lebanon, Netherlands, New Zealand, Norway, South Africa, U.S.A. and U.K. The U.S.S.R. is the only country which was invited but as yet has not sent representatives. Some non-invited countries and representatives of specialised agencies and non-governmental organisations are attending as observers.

The delegates were welcomed by Sir Stafford Cripps, President of the Board of Trade. Mr. H. A. Marquand heads the British delegation, with Mr. Clair Wilcox as head of the United States members.

HOW THE STATE CAN AID INDUSTRY

Sir David Maxwell Fyfe told members of the National Union of Manufacturers at Liverpool that he believed that in the field of every product whose sale had to be considered, State ownership and State monopoly meant loss of liberty to the workpeople, diminution of enterprise, rise in cost to the consumer, and patronage in industrial appointments. The State could, however, define and enforce minimum physical conditions of working, and it could play an important part in the field of research. The Department of Scientific and Industrial Research had done excellent work, but there were always new activities ready to its hand. Another field in which the State could assist or hamstring industry was that of taxation.

PIG-IRON AND STEEL PRODUCTION IN GREAT BRITAIN (*Continued from previous page*).

TABLE IV.—*General Summary of Pig-iron and Steel Industry.* (*Weekly Averages in Thousands of Tons.*)

Period.	Iron-ore output.	Imported ore consumed.	Output of pig-iron and ferro-alloys.	Scrap used in steel-making.	Steel (incl. alloy).			Steel stocks held by producers, etc.*
					Imports.	Output of ingots and castings.	Deliveries of finished steel.	
1944	297.6	46.8	129.5	141.7	26.6	233.5	197.5	2,171.0
1945	272.5	77.2	136.7	138.5	2.9	227.3	171.6	1,683.9
1946—March	256.4	108.1	147.3	155.2	5.8	255.7	200.6	1,173.0
April	243.5	111.4	148.7	152.4	5.6	252.1	184.6	1,129.6
May	244.9	115.1	151·2	159.1	10.6	261.8	203.4	1,146.1
June	225.5	118.7	151.5	142.9	9.0	239.8	191.8	1,130.7
July	220.3	119.4	147.0	137.5†	6.5	226.1	176.6	1,160.6
August	223.6	118.9	145.3	133.8	10.2	226.0	172.9	1,198.9

* Stocks at the beginning of the years and months shown. † Revised.

NEWS IN BRIEF

THE PRODUCTION OF steel castings in August was 6,600 tons, against 5,500 in July.

WILLIAM ARNOLD & SON (HUDDERSFIELD), LIMITED, Birkhouse Boiler Works, Paddock, Huddersfield, will celebrate their centenary next year. They were one of the first firms to make a steam road vehicle.

THE DALE FORTY ENGINEERING COMPANY, LIMITED, is being wound up voluntarily. Mr. A. A. Dale, Soundess House, Henley-on-Thames, Oxon, and Mr. G. C. Forty, 83, New Street, Birmingham, are the liquidators.

THE COMPANIES' REGISTRATION OFFICE give notice that the names of the undermentioned companies have been struck off the register, and are thereby dissolved:—British Drill & Engineering Company, Limited; Charcoal Burners, Limited; Metal Surfacing Company, Limited.

THE PORTUGUESE GOVERNMENT is reported to have placed a contract worth about £1,400,000 with Yarrow & Company, Limited, Scotstoun, Glasgow, and Vickers-Armstrongs, Limited, Barrow, for the repair and modernisation of the Portuguese destroyer squadron within three years.

THE FIRST LIST OF German firms in Poland to be nationalised by special Government decree includes over 30 coal mines, several zinc and iron-ore mines, and steel plants. All the "Hermann Göring" firms, including mines and ironfoundries in Polish Silesia, have been nationalised under the new decree.

SIR RICHARD FAIREY, chairman and managing director of the Fairey Aviation Company, Limited, presiding at the annual meeting of the company, said that an advanced stage had been reached in negotiations for the acquisition of a controlling interest in Weatherley Oilgear, Limited, of Arch Street, London, S.E.1.

SINCE MARCH, 1944, no supplies of pig-iron have been received in Eire from Great Britain. It is now learned that about 500 tons of pig-iron will be received from Great Britain during the next six months, and while this quantity is small compared with pre-war requirements, it will help to ease the problem of the foundries, whose stocks of scrap are now virtually exhausted.

THE PARTNERSHIP BETWEEN Herbert Wilson, Frederick Arthur Taylor and Bertram Taylor, carrying on business as engineers and toolmakers at 5A and 5B, Suffrage Street, Smethwick, Staffs, under the style of Motor Components Engineering & Press Tool Company, has been dissolved by mutual consent. Debts will be received and paid by Mr. H. Wilson, who will continue the business.

SOUTH WALES STEEL INTERESTS are understood to have decided that the new hot-strip mill and the concomitant tinplate and sheet cold-reduction mills planned in South Wales should form one economic unit and be under one ownership and management, or be so closely integrated as to achieve the same result. With this end in view, it is proposed that a new company should be formed to acquire appropriate assets now separately owned.

THE SOUTH DURHAM STEEL & IRON COMPANY, LIMITED, have secured a contract for the supply of 4,500 tons of large-diameter steel pipes for the Liverpool City Council's new water scheme at Lake Vrynwy, North Wales, and a further contract for 3,000 tons of steel piping for the Sunderland & South Shields Water Company. The two contracts, the value of which exceeds £25,000, will be carried out at the company's works at Stockton-on-Tees.

DORMAN, LONG & COMPANY, LIMITED, have offered to purchase for cash the shares of the Middlesbrough Exchange Company, Limited. The offer is conditional on acceptance before October 31, 1946, by the holders of at least 75 per cent. of the issued share capital of 992 shares. The directors of the Exchange recommend acceptance of the offer. It is understood that Dorman, Long & Company envisage the use of the Exchange buildings for administrative purposes.

THE NOTTINGHAM SOCIETY OF ENGINEERS has entered upon the jubilee session of its 50 years' existence. The Society was known originaly as the Nottingham Guild of Mechanical and Electrical Engineers. The president-elect for the jubilee year is Mr. E. G. Phillips, a consulting engineer and an advocate of district heating since 1914. He is chairman of the North Midland Fuel Economy Committee and of the East Midland section of the Institute of Fuel.

WALMSLEYS (BURY), LIMITED, have acquired control of Walker Bros. (Wigan), Limited, colliery engineers, ironfounders, etc. The Wigan company will continue to specialise in ventilating plant, but will put at the disposal of Walmsleys a considerable proportion of its capacity for producing paper-making machinery. Mr. John Wolstenholme, chairman and managing director of Walmsleys, becomes chairman of Walkers, and Col. J. S. A. Walker deputy chairman and managing director.

A DEPUTATION FROM THE Society of Motor Manufacturers and Traders concerning the effect the proposed allocation of sheet steel would have on the motor industry in 1947 was received by the Minister of Supply last week. Mr. Wilmot attributed the situation largely to loss of imports and enormously increased consumption, resulting in the demand outstripping even the enhanced rolling capacity of the steel industry. He assured the deputation that their case would receive full and immediate consideration.

SPEAKING ON "Controls—Their Uses and Abuses" at a luncheon meeting of the Engineering Industries Association at Birmingham recently, Viscount Davidson, the president, said he believed the future solution in this country rested with all the partners of industry, the operatives, the management and the capital, who, each in their own sphere, knew the facts, making up their minds that party politics, however much they might attract them in other spheres, must not be allowed to interfere with the successful running of industry.

THE STAMPED OR PRESSED METAL WARES WAGES COUNCIL (GREAT BRITAIN) has announced its intention to submit to the Minister of Labour and National Service proposals for the revocation of the Stamped or Pressed

Metal Wares Wages Council (Great Britain) Wages Regulation Order, 1945, and for the fixing of specified statutory minimum remuneration in substitution for the minimum rates of wages at present in operation, and also for the revocation of Order Q(42), which deals with holidays with pay, and for the making of a Wages Regulation Order in substitution for the provisions at present in operation.

THE DIRECTORS OF Mellowes & Company, Limited, manufacturers of lead pipes, metal sashes, etc., of Sheffield, propose to offer 200,000 new ordinary shares of 5s. each to shareholders at 26s. per share in the ratio of one new share for every two shares held by holders registered on October 5. Meetings will be held on October 31 to consider resolutions whereby the authorised capital will be reorganised and increased to £350,000 in 200,000 preference shares of £1 and 600,000 ordinary shares of 5s. by the creation of 150,000 5 per cent. preference shares and an additional 200,000 ordinary shares.

JOHN HARPER & COMPANY, LIMITED, general iron-founders, etc., of Willenhall, entertained 190 long-service employees on October 12. One has completed 60 years' continuous service, eight others upwards of 50 years, many more than 40 years, and the remainder periods exceeding 25 years. There is one instance of three generations being in the company's employ. A certificate was presented to each of the long-service employees. The first recipient was Mr. John H. Harper, chairman of the company, who has completed 36 years' service. In addition to the certificate, those employees who have completed 40 years and over received a cheque.

SHORTAGE OF LABOUR was the only obstacle to a period of real prosperity in the tinplate trade, said Mr. T. O. Lewis, chairman of the Joint Industrial Council of the industry, speaking at Swansea recently. Details of a training scheme, the aim of which was to give returning millmen an opportunity of hardening before re-entering normal grades and young men from outside the industry an opportunity to train in mill practice, were enthusiastically received at the gathering of members of the managerial and supervisory staffs and union representatives in the West Wales works of Richard Thomas & Baldwins, Limited, at which Mr. Lewis was speaking.

THE WHOLE OF THE Sheffield trades had ample work on hand; in fact, with the possible exception of certain specialised sections in heavy-steel plants, the order-books were almost an embarrassment, said the Hon. R. A. Balfour, speaking on his installation as Master Cutler at Sheffield recently. A very creditable portion of this load was for the development of export markets. There were inevitable problems. The greatest was in maintaining production in the face of difficulties. There was a general shortage of labour and in particular of men and women with the traditional craftsmanship which had done so much for Sheffield's reputation for quality, and was just as badly needed to-day.

SEPTEMBER PIG-IRON AND STEEL PRODUCTION

Pig-iron output during the third quarter of this year was at the rate of 7,622,000 tons a year, compared with 6,893,000 tons for the third quarter of 1945. September production was at the rate of 7,660,000 tons a year, compared with 7,224,000 tons for September, 1945.

Steel production during the third quarter of 1946 was at an annual rate of 11,953,000 tons, compared with 10,988,000 tons in the third quarter of 1945. Production during September, at a rate of 12,402,000 tons a year, was curtailed due to a labour dispute in Scotland involving the furnace bricklayers.

The table below shows pig-iron and steel production in September and the third quarter of 1946, with previous figures for comparison:—

	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.	Weekly average.	Annual rate.
1946—1st quarter ..	145,500	7,566,000	242,600	12,617,000
2nd ,, ..	150,500	7,827,000	252,100	13,111,000
3rd ,, ..	146,600	7,622,000	230,000	11,953,000
August ..	145,300	7,558,000	225,900	11,747,000
September ..	147,300	7,660,000	238,500	12,402,000
1945—1st quarter ..	134,500	6,992,000	233,200	12,126,000
2nd ,, ..	132,600	6,894,000	227,200	11,814,000
3rd ,, ..	132,600	6,893,000	211,300	10,988,000
August ..	122,300	6,358,000	182,000	9,465,000
September ..	139,300	7,224,000	240,700	12,514,000

WELDING OF LIGHT ALLOYS

A symposium on the welding of light alloys, organised by the British Welding Research Association, was held at the Henry Jarvis Memorial Room, Portland Place, London, W.1, on October 16 and 17, when a series of technical Papers was presented. The sessions were preceded by a reception, given at 29, Park Crescent, W.1, on the evening of October 15, when the Director of Research, Mr. A. Ramsay Moon, welcomed guests attending the meeting. The chairman of the council, Sir Stanley Goodall, was present, and the guests included:—Dr. N. P. Allen, of the National Physical Laboratories; Mr. A. Dyson, president of the Institute of Welding; Sir Frederick Handley Page; Sir Ewart Smith and Sir Arthur Smout, Imperial Chemical Industries, Limited; Sir Frederick C. Stewart, Thermotank, Limited; Prof. G. Wesley Austin, Cambridge University; and Dr. E. G. West, Aluminium Development Association.

The proceedings at the discussions covered the development of strong aluminium alloys for welding; pressure, spot and flash welding of light alloys, and the techniques for welding magnesium-base metals. Papers, presented after the opening remarks by the first chairman, Sir Arthur Smout, included memoranda submitted by research committees, techniques of the Argonarc process and applications of flash welding by Asea Svetsmaskiner, Stockholm. An exhibition was held concurrently at the Park Crescent headquarters of the Association.

PERSONAL

MR. WILLIAM WATT has joined the board of Bruce Peebles & Company, Limited.

LORD LLOYD has been elected to the board of Horseley Bridge & Thomas Piggott, Limited.

MR. GEORGE MANN has resigned his position as manager of Auto-Transmissions, Limited, Coventry.

MR. SAM CLIFFE, foundry foreman at the works of Peglers, Limited, Doncaster, has retired after 40 years' service.

THE HON. E. H. JESSEL has been co-opted to the board of Textile Machinery Makers, Limited, in place of the late Mr. G. H. A. Sington.

MR. SAMUEL YATES, manager of Town End Foundry, Ltd., Chapel-en-le-Frith, for the past 21 years, has been appointed a Derbyshire County Magistrate.

MR. L. D. WILLIAMS has been appointed a director of the Briton Ferry Steel & Tinplate Agency, Limited, in place of MR. T. CROSBY, who has resigned.

MR. WILFRID WRIGHTSON, who has served the company for 34 years, has resigned from the board of Head, Wrightson & Company, Limited, Stockton-on-Tees.

MR. J. H. BUTLER has resigned his position as chief engineer of Consett Iron Company, Limited, in order to become chief engineer of the Stanton Ironworks Company, Limited.

MR. S. T. JAZWINSKI, until recently with K. & L. (Steelfounders), Limited, of Letchworth, Herts, has been appointed chief metallurgist of the Barium Steel Corporation, Canton, Ohio, U.S.A.

MR. F. O. EVERARD, a director of Belliss & Morcom, Limited, engineers, of Birmingham, has been presented with a gold cigarette case on the completion of 60 years' service with the company.

MR. F. BAUGH, for many years crucible and refractory representative in the Midlands, has left the Carborundum Company, Limited, to take up another position. He is succeeded by MR. R. G. HOLMES.

MR. W. H. SHARP has been appointed assistant managing director of Thomas Smith & Sons (Rodley), Limited. This Yorkshire firm, manufacturers of cranes, excavators, etc., also announce that MR. FREDERICK JOHNSON has become a local director.

MR. T. J. PEAKE has joined the staff of Aluminium Laboratories, Limited, Banbury. He was formerly responsible for advisory work on non-ferrous metals in the department of the Superintendent, Technical Applications of Metals (S.T.A.M.), Ministry of Supply.

MR. C. G. MCAULIFFE, on relinquishing his appointment as Controller of Light Metals in the Ministry of Supply at the end of August last, has taken up an appointment as a departmental manager in the sales division of the British Aluminium Company, Limited.

MR. MICHAEL H. BOWLING has been appointed a director of John Bowling & Company, Limited, of Cyclops Foundry, Kirkstall Road, Leeds. He has recently been demobilised after serving for more than five years in H.M. Forces, including two years in S.E.A.C.

SIR ANDREW DUNCAN, chairman of the British Iron and Steel Federation, sailed for the United States in the "Queen Elizabeth" last week. It is understood that he will confer with leading American steel manufacturers on the world steel situation, with particular regard to imports into the United Kingdom in 1947.

MR. CHARLES R. KNAGGS has retired from the position of pig-iron salesman and ore buyer with Dorman, Long & Company, Limited, after more than 55 years' service with the company. During the 1914-18 war he played a prominent part in the control and allocation of ore imports and pig-iron production on the North-East Coast. Mr. Knaggs was recognised as an expert in the selection and handling of foreign ores for blast-furnace use.

Wills

GARRARD, MAJOR S. H., chairman and joint managing director of the Garrard Engineering & Manufacturing Company, Limited £69,407

CAKEBREAD, E. F., co-managing director of Cakebread, Robey & Company, Limited, engineers, of Wood Green, London, N.22 ... ... £48,376

POWER FOR STEELWORKS' EQUIPMENT

The first meeting of the Iron and Steel Engineers' Group of the Iron and Steel Institute was held at 4, Grosvenor Gardens, London, S.W.1, last week. The chairman was Mr. W. F. Cartwright, of Guest Keen Baldwins Iron & Steel Company, Limited. No Papers were presented, but a number of people gave short talks on specific subjects, followed by informal open discussions. The morning session had for its subject, "Steelworks' Locomotives—Diesel *versus* Steam," and the talks were opened by Mr. G. R. Walshaw, Appleby-Frodingham Steel Company, Limited; Mr. C. C. H. Wade, English Electric Company, Limited, and Mr. J. Alcock, Hunslet Engine Company, Limited. In the afternoon meeting discussions were opened on the subject of a.c. or d.c. drive for steelworks' cranes and ore bridges by Mr. L. Rothera, of Colvilles, Limited; Mr. Russell Taylor, Igranic Electric Company, Limited, and Mr. J. Parker, McLellan & Partners.

GERMAN STEELFOUNDRIES (including information on silicosis preventive measures) are the subject of Report B.I.O.S. 716, made by a team of industrial experts who have visited Germany under the auspices of the British Intelligence Objectives Sub-committee. The report is obtainable from H.M. Stationery Office, price 6s. 8d. post free.

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Manufactured to guaranteed analyses in seven standard grades. Also obtainable to individual specification

THE 17-TON CASTING ILLUSTRATED IS ONE OF A SERIES MADE IN A STANTON FOUNDRY FROM STANTON DALE IRON

1. Core being lowered into mould
2. Pouring the metal
3. Finished casting in transit

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STANTON IRONWORKS
COMPANY LIMITED
NEAR NOTTINGHAM

COMPANY RESULTS

(Figures for previous year in brackets.)

Ferranti—Dividend of 6%, tax free (same).

Babcock & Wilcox—Interim dividend of 5% (4%).

Associated Fire Alarms—Dividend of 5% (3%).

Metal Closures—Interim dividend of 15% (12½%).

W. G. Frith & Company—Interim dividend of 5% (nil).

Enfield Cable Works—Interim dividend of 3½% (6¼%).

Pressed Steel Company—Interim dividend of 10% (same).

Tweedales & Smalley (1920)—Interim dividend of 5% (same).

George M. Callender & Company—Dividend of 15% (10%).

Metal Agencies Company—Interim dividend of 10% (same).

Darlington Wire Mills—Interim dividend of 7½%, tax free (same).

Expert Tool & Case Hardening Company—Interim dividend of 15%.

United Steel Companies—Final dividend of 5½%, making 8% (same).

Richard Crittall & Company—Interim dividend of 50% on doubled capital (nil).

Braithwaite & Company (Engineers)—Final dividend of 4½%, making 7½% (same).

Baldwins (Holdings)—Dividend of 10% and bonus of 2½% (7½% for nine months).

Parsons Marine Steam Turbine Company—Final dividend of 11%, making 15% (same).

Hughes-Johnson Stampings—Final dividend of 7½% and bonus of 5%, making 21% (25%).

Cochran & Company, Annan—Final dividend of 3½% (2½%), making 5% (4%), tax free.

F. Reddaway & Company—Net profit for 1945, £20,056 (£24,804); dividend of 5% (8%); forward, £25,546 (£22,881).

Ransomes & Rapier—Interim dividend of 2%, tax free (same) on the ordinary shares, and of 1%, tax free, on the new ordinary shares.

Railway & General Engineering Company—Net profit for the year ended March 31, after providing for N.D.C. and income-tax, £3,039 (£3,308); dividend of 8¾%; forward, £7,925 (£7,977).

Wombwell Foundry & Engineering Company—Net profit, after tax, for the year ended July 31, £9,917 (£8,540); to reserve for depreciation, £2,000 (same); dividend of 16% (same); forward, £7,929 (£7,747).

Bennis Combustion—Net profit for the year ended April 30, after tax, £12,108 (£10,030); tax to date, £9,250 (£11,000); to general reserve, £4,000 (£3,000); final dividend of 5%, making 10% (same); forward, £3,948 (£2,927).

Specialloid—Net profit for the year ended March 31, after allowing for recovery of taxation, £37,548 (£55,574); to taxation, £25,305 (£22,378); dividend of 100%, the final payment of 75% being on an enlarged capital (100%); forward, £21,114 (£36,826).

John Dale—Trading loss for 1945, after depreciation, etc., £67,417 (profit £24,938); estimated E.P.T. recoverable, less tax, £97,000 (nil), credited together with rents receivable and interest of £1,310; net balance, £15,167 (£2,338); forward, £73,522 (£67,618).

William Doxford & Sons—Net profit for the year ended June 30, after taxation, depreciation, etc., £159,285 (£184,817); to general reserve, £50,000 (£75,000); to reserve for plant extensions and renewals, £100,000 (nil); final dividend of 10% and bonus of 10%, making 25% (17½%); forward, £76,117 (£59,332).

Horseley Bridge & Thomas Piggott—Trading profit for the year ended June 30, £111,969 (£127,116); income from investments, £1,135 (£1,721); taxation, £37,000 (£62,914); depreciation, £21,000 (same); net profit, £51,744 (£40,686); dividend of 15% (same); contingencies, etc., £25,000 (£15,000); forward, £68,771 (£68,352).

A. & J. Main & Company—Trading profit for 1945, after tax, £49,924 (£51,473); depreciation, £9,674 (£9,500); retiring allowances, £2,279 (£2,237); interest, £157 (£5,320); A.R.P., nil (£299); net profit, £36,814 (£33,117); to general reserve, £20,000 (same); dividend of 10% (same) and special dividend of 5½%, tax free (nil); forward, £13,542 (£11,238).

Richard Johnson, Clapham & Morris—Net trading profit for the year ended June 30, after depreciation, £59,363 (£48,606); staff bonus, £4,000 (£3,500); to taxation, £36,000 (£31,500); to general reserve, £10,000 (£5,000); final dividend of 11¼% (same) and bonus of 10% (5%), making 25% (20%); participating dividend of 3%, making 9%, £1,061 (£643); forward, £5,879 (£7,122).

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

Compact Compressor Company, 174, Edmund Street, Birmingham, 3—Manufacturers of compressors, pumps, engines and gears, etc. £1,500. G. F. Austin.

R. M. Brown & Company, Tractor Depot, Station Road, Melburn, Royston, Herts—Agricultural and general engineers, etc. £3,000. R. M. Brown.

Mallord Engineering Company—£5,000. H. F. James, A. E. Mines, D. C. Burgess, A. Hornby, Norfolk House, Laurence Pountney Hill, London, E.C.4.

Kimberdown—Engineers, ironfounders, etc. £1,000. E. M. and C. H. H. Downing and R. N. and H. F. Loftin, 46, Courtenay Gardens, Upminster, Essex.

Mayflower Metal & Plating Company, Mayflower Works, Sutton Road, Plymouth—£3,500. H. A. W. and L. M. Hicks, L. de Lisle, and A. H. Venner.

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Raw Material Markets

IRON AND STEEL

Strong pressure is being exerted by all users of light castings. Large quantities of castings are needed for the building industry, and many other essential trades want supplies. The light-castings industry is doing everything it can, but the foundries are overburdened with work and urgently need additional labour. They are getting, at the moment, all they require in the way of high-phosphorus pig-iron, but their stocks are meagre and any wide expansion in output would cause difficulty in the matter of pig-iron supplies. Stocks at the furnaces also are short, and it does not seem possible, at present, to put in additional furnaces because of shortage of labour and coke.

The demand for special pig-iron for the general engineering, jobbing and speciality foundries is at a high level, for these foundries are now very active. Fortunately, good deliveries of medium- and low-phosphorus pig-iron, hematite and refined iron are being made. The demand for refined iron has crept up considerably during the last month or two, due to the Control permitting the export of this type of iron. It is understood that additional plant is likely to be put into operation shortly.

The supply of scrap is fair but the foundries need bigger supplies of the lighter grades.

The foundries experience no difficulty in securing all they require in the way of limestone and ganister, and firebricks can be had within reasonable delivery periods.

There cannot be any easing of the semi-finished steel position until larger imports become possible. Every effort is being made by the Control to purchase large tonnages abroad. The re-rollers in this country are extremely busy and all are in need of billets or sheet bars. Extra supplies have been forthcoming from the home makers in recent months, which, of course, has helped the situation, but the increase does not counteract the drop in imports. The re-rollers of bars, light angles, strip and casement sections are in most urgent need of 2-in. to 3-in. billets, and to help the situation they are ready buyers of any defective billets, crops or other forms of re-rolling material which become available. Stocks are very low and in most cases supplies are available only from current rollings. There is heavy pressure on the sheet-bar makers from the sheet mills, which are committed for many months ahead; in fact, pressure for sheets is so great that it is difficult to place fresh business, and any which does arise is for delivery late in 1947.

The steelworks are overwhelmed with specifications for plates, joists and sections. Some difficulty is experienced by users in getting additional requirements placed, despite the fact that the steel is for essential purposes, as "luxury" work would not be permitted. Users are having to look very far ahead, as many of the rollings of joists, sections and plates now being offered by the works come into Period I or II of next year, or even later.

The makers of many types of special steel are well provided for work for home and export. There continues to be very strong pressure indeed for stainless steel, all forms of steel tubes, cast-iron pipes, wire, wire rods and all sizes of rails. The makers of black and cold-rolled strip are also well placed. Large quantities of strip are wanted in connection with housing alone, and there are many other users, including motor manufacturers, who are seeking strip.

NON-FERROUS METALS

There is still a decidedly "bull" tendency in the non-ferrous metal markets. The new price for tin is expected to remain for some time, but increases in copper, lead and zinc are not unlikely. Demand for metal remains good. Scrap prices have firmed up a little.

The "Statistical Bulletin" of the International Tin Research and Development Council states that world tin production (export) in the first half of 1946 amounted to 43,250 long tons. This amounts to 54 per cent. of the average half yearly production of 80,530 tons in the years 1938—1941 inclusive and 36 per cent. of the average half yearly production in 1941, when the output reached its peak. World apparent tin consumption in the first six months of 1946 is estimated at 56,000 tons, which is 71 per cent. of the average half-yearly consumption of 78,280 tons in the years 1934—1938 inclusive and 56 per cent. of the average half-yearly consumption in 1937, when consumption reached its peak. The known stocks of tin metal in the world (exclusive of consumers' stocks) amounted to 64,400 tons at June 30, 1946, which means a decrease of 8,000 tons as compared with December 31, 1945. This drop can be mainly attributed to exports from the United Kingdom.

CONTRACTS OPEN

Any date given is the latest on which tenders will be accepted. The address is that from which forms of tender may be obtained.

Cheltenham, October 30—Construction of approx. 660 yds. of 9 in. to 18 in. dia. surface water drain, together with manholes, etc., for the Borough Council. Mr. G. Gould Marsland, borough engineer, Municipal Offices, Cheltenham. (Fee £1 1s., returnable.)

Dover, November 2—Supply and erection of 524 yds. of new unclimbable wrought-iron fencing, for the Borough of Dover. The Borough Engineer, Maison Dieu House, Dover. (Fee £2 2s., returnable.)

Easthampstead, October 30—Provision and erection of chain-link fencing, together with gates, for the Rural District Council. The Engineer and Surveyor, Council Offices, Church Road, Bracknell, Berks.

Mountain Ash, November 9—Supply and erection complete of new suspension steelwork and decking to existing towers and anchorages of bridge, for the Urban District Council. The Engineer and Surveyor, Town Hall, Mountain Ash.